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***Has the world yet produced a truly
satisfactory shock absorber?***

From the following it would not seem so.

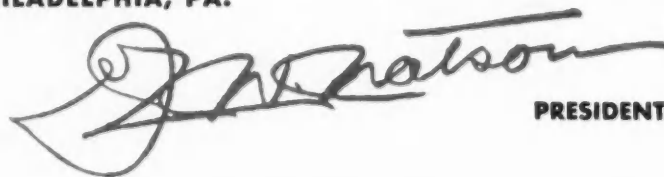
●

The builders of 5 of the 7 most costly cars produced in the world have recently sent us their inquiries for full information on the coming Watson Double-Acting GYRO Stabilators. This simply must mean that regardless of any amount of money which can be spent for shock absorbers there is none yet which really satisfies as regards results produced.

●

We have good reason to know that the coming Watson Double-Acting GYRO Stabilators will leave very little if anything to be desired as regards results produced. Furthermore, the price will be right. Announcement will now be made very shortly.

**JOHN WARREN WATSON COMPANY
PHILADELPHIA, PA.**


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S·A·E· JOURNAL

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The purpose of meetings of the Society is largely to provide a forum for the presentation of straightforward and frank discussion. Discussion of this kind is encouraged. However, owing to the nature of the Society as an organization, it cannot be responsible for statements or opinions advanced in papers or in discussions at its meetings. The Constitution of the Society has long contained a provision to this effect.

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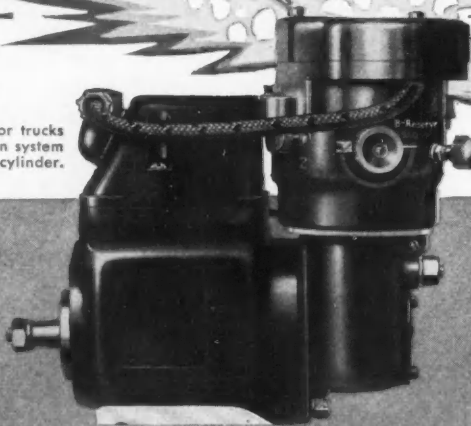
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
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(18)

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"Get into the Field!"

Operators Advise Factory Men

Toronto Transportation Meeting Speakers, Emphasizing Need for Factory-Field Cooperation, Reveal Engineering Facts on Design, Control, Operation and Regulation

ENGINEERS who attended the Transportation Meeting in Toronto, Oct. 4 to 6 inclusive, found at least two sides to such subjects as proper commercial-vehicle regulation, ventilation, refrigeration, control and the like, but all hands seemed to agree that the best way for a manufacturer to build a commercial vehicle to suit the operators' needs is for the manufacturer to experience these needs through personal contact and intimate study of field conditions.

In the course of eight important sessions and through the medium of golf battles, sightseeing trips and inspection visits, many interesting and vital matters, technical and otherwise, were brought to light for the general benefit of those who are interested in the many phases of the commercial-vehicle business. Canadian members lived up to great expectations in the way of hos-

pitality, appreciation for which was often expressed by the visiting delegates from abroad.

Perhaps Vice-Presidents Bachman and McArthur deserve first mention for the success of the big affair; but they would pass the credit along to their Meetings Committees and Chairmen, L. R. Buckendale and A. F. Coleman, who, in turn, would give a big hand to the speakers, session chairmen and such effective members of the Canadian Section as Chairman A. N. Bentley, M. L. Brown, R. H. Combs, G. W. Garner and J. L. Stewart. They would mention also the courtesy of Paul Seiler, the General Motors Truck Corp., Alex McArthur and the Toronto Transportation Commission, for the buses that were provided and for the visits that were greatly enjoyed.

At any rate, a host of expert talent was responsible for a "top-

hole" meeting, which is reported in some detail in the pages that follow.

Rarely have transportation men indulged in a more *versatile* meeting in which so many diversified interests have been incorporated. Among the pleasing innovations were the luncheons at which opportunities were afforded for friendly exchange of information and where the members and guests were privileged to hear authoritative short addresses by men of note in the field of transportation and allied activity.

Members from the United States enjoyed making the acquaintanceship of Canadian men of note. In fact, each of the sessions was sponsored by a Canadian member, who introduced the chairman and spoke a word of welcome to his audience. Although the Canadian speakers and honored guests at the Old En-



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T. A. RUSSELL



A. N. BENTLEY

Meetings Calendar

General Meetings

Annual Dinner—Jan. 12, 1933

Hotel Pennsylvania, New York City

Annual Meeting—Jan. 23 to 26, 1933

Book-Cadillac Hotel, Detroit

Section Meetings

Baltimore—Nov. 17

Hotel Emerson; Dinner 6:30 P.M.

Traffic and Safety—H. M. Lucius, Automobile Club of Maryland; George Lurz, Maryland State Police Department and H. B. Potter, United Railways & Electric Co. of Baltimore

Canadian—Nov. 16

Royal York Hotel, Toronto; Dinner 7:00 P.M.

Chicago—Nov. 1

Hotel Sherman; 8:00 P.M.

Distillate and Kerosene Engines—K. T. Winslow, Waukesha Motor Co.

Cleveland—Nov. 7

Cleveland Club; Dinner 6:30 P.M.

Why Airships—Dr. Karl Arnstein, Vice-President, Goodyear-Zeppelin Corp. Motion pictures showing history of lighter-than-air craft and building of the U.S.S. Macon

Dayton—Nov. 17

Engineers' Club of Dayton; Dinner 6:30 P.M.

Subject: Electric Refrigeration, with special mention of use of refrigeration on trucks and in car cooling

Detroit—Nov. 7

Book-Cadillac Hotel; Dinner 6:30 P.M.; Simultaneous sessions at 8:00 P.M.

Aeronautic Activity

The Use of Airplanes by Newspapers—James V. Piersol

Body and Production Activity

Glass, Its History and Manufacture—R. A. Miller

Passenger-Car Activity

Electric-Furnace Iron; Foundry Viewpoint, A. E. Hageboeck; Metallurgical Viewpoint, L. A. Danse; Engineering Viewpoint, Harry T. Woolson.

Transportation—Dr. C. F. Hirshfeld

Indiana—Nov. 10

Indianapolis Athletic Club; Dinner 6:30 P.M.

The Crisis in Highway Transportation and Automotive Taxes—A. J. Scaife, White Motor Co.

Highway Traffic Menaces Here and Elsewhere—Sam C. Hadden, Indiana Motor Traffic Association
Greetings from Headquarters—John A. C. Warner

Metropolitan—Nov. 3 and 17

Nov. 3—Hotel New Yorker, New York City.

Dinner 6:15 P.M. The Development of Hydrofoils for High-Speed Motorboats—Dr. O. G. Tietjens, Westinghouse Electric & Mfg. Co.

Nov. 17—Diesel Ship Santa Maria, Pier 33, Foot of Hamilton Avenue, Brooklyn, N. Y. Diesel Engines—Louis Ford, Editor *Motorship*

Milwaukee—Nov. 5

Allis-Chalmers Clubhouse; 8:00 P.M.; Buffet supper after meeting

Some Aspects of Tractor Economics—F. N. G. Kranich

Farm Tractors and Low-Pressure Tires—Walter F. Strehlow, Allis-Chalmers Mfg. Co.

Northern California—Nov. 9

Elks Club, San Francisco. Dinner 6:30 P.M. Tractors

New England—Nov. 9

Walker Memorial, Massachusetts Institute of Technology, Cambridge, Mass.; Dinner 6:30 P.M.

Hydrogenation—Dr. Robert T. Haslam, Standard Oil Development Co.

Philadelphia—Nov. 8

715 North Broad Street; Dinner 6:30 P.M.

Aircraft Meeting—Entertainment by Aircrafters

The Coast Guard Airplane—Henry Cocklin, General Aviation Mfg. Corp.

Pittsburgh—Nov. 15

Fort Pitt Hotel; Dinner 6:30 P.M.

Employee-Owned Cars in Business—John M. Orr, Equitable Auto Co.

Southern California—Nov. 4

Frank Wiggins Trade School, Los Angeles; Dinner 6:30 P.M.

High-Compression Engines—Ethelbert Favary

Syracuse—No Meeting

Washington—Nov. 16

Racquet Club; Dinner 6:30 P.M.

Super-Balloon Tires

glish Dinner were men of high distinction in Canada, they made the visiting delegates from the United States feel very much at home and entirely free from the necessity of stiffness and formality.

Committees Transact Business

At the call of Chairman L. R. Buckendale, a meeting of the Motor-Truck Rating Committee was held during the Toronto meeting and further advancements made toward an ultimate conclusion that will be satisfactory to all concerned. The Committee unanimously agreed to confirm the method of rating that previously had been tentatively adopted and to subject it to the acid test of trial in the field before final adoption as a permanent practice.

Under the sponsorship of Vice-Presidents Bachman and McArthur, a meeting of the Motor-Truck and Motorcoach and the Transportation and Maintenance Activity Committees was held and resulted in the formulation of definite plans for transportation sessions at the Annual Meeting in Detroit next January. Numerous other matters considered included proper cooperation in the Highway and Building Congress to be held under the auspices of the American Roadbuilders Association in Detroit next January. The Committees agreed upon plans reported by Vice-Chairman L. V. Newton for the Transportation Meeting to be held in Chicago during the week of Sept. 11, next year, at the time of the Century of Progress Exposition. Final completion of the details and essentials of these plans will be handled by the Committees that will take office at the beginning of the new administrative year next January.

Another important meeting was that of the Military Motor-Transport Advisory Committee. Plans were discussed by Chairman B. B. Bachman for further progress by the Committee, working toward the completion of recommendations to the Quartermaster Corps by the time of the Annual Meeting next January.

Definite recommendations were approved at the meeting of the Automotive Transport Code Committee, of which F. K. Glynn is Chairman, as the result of cooperation of the transportation committees of the American Petroleum Institute and the National Electric Light Association, as a basis for uniform State regulation of commercial motor-vehicle dimensions and weights.

Fresh Air and Cold Air

Motor-Vehicle Ventilation and Mechanical Refrigeration Discussed at Opening Technical Session

AT the opening session of the Transportation Meeting on Tuesday morning, Oct. 4, which was presided over by F. C. Horner, General Motors Corp., New York City, W. J. Cumming, Chairman of the Subcommittee on Motorcoach and Motor-Truck Ventilation, presented a report dealing with the elimination of exhaust-gas odor from motor-vehicles and the ventilation of motorcoaches. This report, which covers these subjects in considerable detail, is printed in the Transportation Engineering Department of this issue.

High Manifold Vacuum Important

W. B. McGorum, Virginia Electric & Power Co., Norfolk, stressed the importance of high manifold vacuum. He said that, if means could be found to prevent the formation of the cloud of acrid sickening white smoke that is emitted from the exhaust pipe during deceleration and enters the windows, if they are open, the public would have little cause for complaint about motorcoach ventilation.

Gum incrustations on the interior of intake manifolds also play a part in causing fumes. These incrustations become porous when heated, absorb gasoline and dirt particles and, when the throttle is closed, this fuel is pulled out by the high vacuum, thus enriching the mixture much more than would be caused by an increased flow through the idling jet. This source of fume formation cannot be overcome by merely shutting off the high vacuum from the carburetor during the overrunning period.

Locating the exhaust pipe so that it will discharge reasonably close to the front of a rear wheel was the remedy offered by J. M. Orr, Equitable Auto Co., Pittsburgh, to prevent fumes from entering the vehicle. This had been found satisfactory in Pittsburgh because the violently agitated area around the moving wheel served to dissipate the exhaust gases so that none, or at least a negligible portion of them, entered the low-pressure area at the rear of the vehicle and were drawn into the body.

Adequate ventilation of motor-truck bodies from the front, by using open areas, air tubes or ventilators with provision for increasing or decreasing the volume of air introduced but not permitting complete closure was advocated, as such flow of air minimized the difference in air pressures between the front and rear of the body. Motorcoach ventilation and the elimination of offensive odors have a definite commercial value, the riding habit being difficult to cultivate if passengers are compelled to ride in fume-laden vehicles.

Ventilation of Truck Cabs Urged

T. C. Smith, American Telephone & Telegraph Co., New York City, emphasized the importance of proper ventilation of motor-truck cabs, because the location of the cab next to the engine produces conditions that are almost intolerable in summer. The practice of hinging cab windshields slightly above the center with the idea that they can be pushed out at the bottom, thus permitting air to enter the cab from the bottom and top of the windshield, was condemned



H. M. WILLIAMS



J. W. CARL



W. J. CUMMING

because of the draft that blows down on the back of the driver's neck without cooling the hot dead-air space about his legs and feet.

Ventilators introducing air from the top of the cowl would eliminate this dead-air space. He disapproved of side ventilators at the front of the cowl, as the air driven back by the fan is not only hot but also carries fumes from the crankcase breather. Locating these ventilators at the rear of the cowl has usually proved ineffective as a means of exhausting air from the dead-air space at the bottom of the cab.

A Clean Engine Is Not Odorful

What the Toronto Transportation Commission has done to eliminate odors inside its equipment was outlined briefly by George W. Wright. The first step is a thorough removal of oil, grease and road dirt from the engines, which are given a coat of enamel before reinstalling. This not only reduces the labor of cleaning at inspection periods but also perceptibly decreases odors inside the vehicle. Copper-asbestos gaskets treated with asbestos cement are installed on exhaust manifolds and exhaust-pipe connections and slip-joint manifolds are treated with a special heat-resisting cement to prevent escape of fumes. Flexible tubing in the heating system is treated with asbestos cement, wrapped with asbestos tape and given an additional coating of cement on the outside. All tubing is bracketed to prevent breakage from excessive flexing and vibration. Hot-water heaters have replaced the exhaust type formerly used.

Changing the oil specification has reduced the amount of sludge formed and this, together with an oil change every 1250 miles instead of 2500, has materially reduced the trouble from crankcase fumes. This practice has been supplemented by a careful checking of the vehicle for excessive oil consumption and smoke. Carbureters have been adjusted to give maximum efficiency, better combustion, less fumes and greater mileage. Coasting economizers have been given a try-out and their use indicates that considerable overloading of carbureters at idling or coasting speeds is eliminated with a resultant minimizing of fumes and smoke from incomplete combustion.

Following the presentation of these written discussions, the paper was discussed orally. Chairman Horner emphasized very strongly the need

for an aggressive attack on the ventilation problem and a satisfactory economic solution, as the latter would mean very much in terms of greater passenger comfort and acceptability of motorcoach transportation. A. F. Coleman, Standard Oil Co. of New York, commented on the exceptionally good air-fuel ratios reported by Mr. Cumming, who stated, in answer to a question, that these ratios were observed after between 25,000 and 30,000 miles of operation.

As a means of correcting air contamination in tarpaulin covered bodies, Mr. Smith suggested that the covering should not extend nearer the back of the body than 2 or 3 ft. President A. J. Scaife spoke of the desirability of conducting experiments on the dilution of exhaust gases with air to avoid air contamination in, around and behind the vehicle. He specifically outlined a possible method of bringing the exhaust into an air-chamber of large volume formed in the top of the vehicle where the exhaust could be mixed with the air and thus diluted before being distributed upward into the outside air.

M. C. Horine, International Motor Co., Long Island City, N. Y., pointed out the bad ventilation practices that are seen in other transportation equipment, particularly in Pullman cars where the attempt is made to suck bad air out of a closed box. Incoming air must in this case pass at high velocity through small passages, which is one reason why the floors in Pullman cars are drafty. As a substitute for this method he suggested forcing fresh air in and heating it as desired during the process. He also advocated reversing the natural ventilation of present motorcoaches, which is from the rear toward the front, by forcing air in at the front and having the outlet at the rear. Hot-water heating systems to warm this incoming air were recommended.

L. P. Saunders, Harrison Radiator Corp., Lockport, N. Y., suggested the building up of sufficient air pressure inside the motorcoach to prevent influx of exhaust gases from the outside as one solution of the ventilation problem.

Mechanical Refrigeration of Motor-Trucks

The second paper presented at the session was that by H. M. Williams and J. W. Carl, of the Frigidaire Corp., Dayton, Ohio, entitled Refrigerated Trucks. The paper was pre-

sented by Mr. Williams, while Mr. Carl showed slides of refrigerator motor-vehicles.

Mr. Williams said in part that the sales potential of refrigerator trucks seems to be several hundred new units annually. Motor-truck transportation of meat, milk, ice cream, fruits and farm produce demands refrigeration, as does delivery-truck transportation of butter, cheese, yeast and dough. Large trucks are needed for the former class and smaller ones for the latter, but the refrigeration problems are fundamentally the same.

Desirable body construction was outlined and the different refrigerating systems were analyzed with regard to quantity of refrigeration needed, type of insulation and insulating material available. Mechanical systems were discussed under electric, power take-off and separate gasoline-engine drives for the compressor. The most desirable location on the chassis for a refrigerating unit also was considered.

In opening the discussion, Chairman Horner urged the transportation members of the Society to secure as many operators as possible as members, so that the Society's work might progress at maximum speed. Pierre Schon, General Motors Truck Co., Pontiac, Mich., said that great developments in refrigerated bodies were pending, but that the situation at present is very uncertain, owing to the many variables involved. Cost of mechanical refrigeration must be reduced if this type is to become popular, he said, and added that many failures have resulted from poor construction of the bodies and refrigeration plants, thus calling for research and study by body builders to eliminate defective construction and faulty insulation.

Close Temperature Regulation

In a written discussion Mr. Horine emphasized the necessity for close temperature regulation, pointing out that the permissible range varies with the type of product carried. After mentioning some of the troubles resulting from insufficiently close regulation, he concluded his contribution by stating that a system of temperature regulation which can be applied to almost any system of refrigeration and will maintain temperatures within 2 deg. fahr. in the range of practical cooling temperatures had been developed. Answering the question of L. P. Saun-

ders, Harrison Radiator Corp., Lockport, N. Y., Mr. Williams stated that some work has been done with the absorption-type refrigeration unit, using the silica-gel method.

Weight of refrigeration combinations must be reduced to the minimum to satisfy weight requirements as specified by the regulations of various States, according to W. A. McCutcheon, Kroger Grocery & Baking Co., Cincinnati, Ohio. In this connection Mr. Carl stated that the insulating qualities of the different materials now on the market show very little variation and that the weight of a mechanical refrigeration unit is no greater than that of an ice-and-salt unit having equal refrigeration capacity. While he agreed with Mr. McCutcheon that the opening of doors in a refrigerated body militates against the refrigeration, Mr. Carl called attention to the great success that has been attained through the use of canvas curtains which are equivalent to auxiliary doors. He also stated that the mechanical unit is the cheapest to operate even if a material reduction should be made in the price of dry ice.

Balsa wood, said Mr. Horine, possesses many advantages when compared with cork as an insulating medium. It can be used as an important element of the body structure but must be treated to guard against moisture and rot. Mr. Williams agreed that good balsa wood is equal in insulating value to good cork, but that variations in the grain of the wood result in a corresponding variation in its insulating properties.

Regulation and Accident Prevention

At a luncheon following the session, President Scaife introduced H. C. Kelting, chairman of the Motor-Truck Executives of America, who delivered a short address on How Motor-Truck Operators Meet Regulation.

In his address, Mr. Kelting said that in general truck operators are willing to comply with the laws of their home State and those States that they enter in the transaction of their business, but that this is almost impossible, because of the great variation in the regulations adopted by the different States. He also emphasized the necessity for securing universal reciprocity on State license tags for vehicles engaged in interstate transportation as well as secur-



J. P. BICKELL



H. C. KELTING

ing the passage of uniform laws regulating motor-vehicle operation.

The second speaker at the luncheon was Everett Hoar, Hoar Transport Ltd., Toronto, who spoke concerning the numerous regulations to which motor-truck operators in Canada are subjected. While it had been difficult in the past to observe all of these regulations, he said he felt that they were wisely applied, not in a desire to cripple or suppress the industry but rather to improve the situation, and each operator, therefore, should endeavor to conform to them. In closing, he stated that, while the motor-truck industry believes that it is contributing more than an equitable proportion to the maintenance of the highways in the form of registration and public-carrier-vehicle fees, and gasoline, business and other taxes, the majority of responsible operators are making every effort to comply with the laws and should be paid a commensurate rate.

The third and last speaker, J. P. Bickell, Registrar of Motor-Vehicles for the Province of Ontario, in dis-

cussing the problem of Vehicular and Personal Accident Prevention, stated that three things have appeared to be essential to the proper control of motor-vehicle drivers and the elimination of preventable accidents. These in the order of their importance are a driver's license law, as the driving of a motor-vehicle is a privilege granted by the State and not a right enjoyed by all, a safety-responsibility law and education. After two years of experience with the safety-responsibility law, the Provincial authorities are of the opinion that it is accomplishing the purposes for which it was enacted and is doing much to remove the dangerous or accident-prone driver from the highways. For the last five years the Provincial government has appropriated a considerable sum to conduct a vigorous campaign to combat the accident situation. In this campaign newspapers, magazines, radio, motion pictures and highway bulletin boards are all utilized to emphasize the fact that accidents can, and must, be prevented.

Old English Dinner

Canadian Section and Canadian Speakers Provide an Evening's Entertainment

TUESDAY evening can well be designated Canadian night at the Transportation Meeting, for the Canadian Section of the Society was host to the visitors from below the line, and the chairman, toastmaster and speakers were all Canadian representatives. The Old English Dinner followed a reception at 7:30 p. m. in the concert hall of the hotel, with A. N. Bentley, Chairman of the Canadian Section, presiding and T. A. Russell, president of Willys-Overland, Ltd., of Toronto, officiating as toastmaster. Mayor

W. J. Stewart, of Toronto, welcomed the visitors in a brief address, and the Hon. H. H. Stevens, Minister of Trade and Commerce for Canada, spoke on the subject of three years of adjustment as related to production and distribution. The very enjoyable evening was concluded with humorous remarks on the Restoration of Prosperity, by B. A. Trestail, vice-president and managing director of the Echophone Co. of Canada, Ltd.

Following the welcome extended by Chairman Bentley to the mem-

bers and guests of the Society, the guests of honor seated at the speakers' table were introduced. These were as follows:

B. B. Bachman, vice-president, Autocar Co., and Vice-President of the Society, representing motor-truck and motorcoach engineering

R. H. Combs, president and general manager, Prest-O-Lite Storage Battery Co., Ltd., first Chairman of the Canadian Section

L. R. Buckendale, executive engineer, Timken-Detroit Axle Co., and Chairman of the Motorcoach and Motor-Truck Activity Meetings Committee

A. F. Coleman, manager, motor-vehicle department, Standard Oil Co. of New York, and Chairman of the Transportation and Maintenance Activity Meetings Committee

A. L. Bogan, vice-president, Greyhound Corp., representing National Association of Motor Bus Operators

William C. McBrien, honorary president, Canadian Transit Association

Paul W. Seiler, president, General Motors Truck Co., representing the National Automobile Chamber of Commerce

B. A. Trestrail, vice-president and managing director, Echophone Co. of Canada, Ltd.

A. N. Bentley, manager, Exide Batteries of Canada, Ltd., Chairman of the Canadian Section

The Hon. H. H. Stevens, Minister of Trade and Commerce for Canada

His Worship W. J. Stewart, Mayor of the City of Toronto

A. J. Scaife, consulting field engineer, White Motor Co., and President of the Society

The Hon. Leopold Macauley, Minister of Highways for Ontario Province

D. R. Grossman, vice-president and general manager, Studebaker Corp. of Canada, and president of the Canadian Automobile Chamber of Commerce

H. C. Kelting, secretary, Motor Truck Club of Kentucky, representing the Association of Motor Truck Executives of America

A. S. McArthur, general superintendent, Toronto Transportation Commission, and Vice-President of the Society, representing transportation and maintenance engineering
John A. C. Warner, Secretary and General Manager of the Society

Progress Cannot Be Stayed

In his opening remarks, Toastmaster Russell mentioned with considerable pride the fact that he was the first Canadian member of the Society, his membership dating from 1911. Speaking of the revolutionary changes in transportation and communication, he said that more development in transportation has taken place in the last 100 years than in all the previous thousands of years. Napoleon, in the 19th century, had no better means of transportation than had Julius Caesar or Alexander the Great. Invention of the steam engine changed the whole mode of the world.

Although some persons are trying to correct certain conditions by limiting motor-vehicle operations, said Mr. Russell, attempting to stop progress is foolish. Development of the steel ship and the motorcoach wrecked great industries, such as the building of wooden ships, and changes to come in the future will stifle certain businesses but create new ones.

Toronto Police and Transportation System

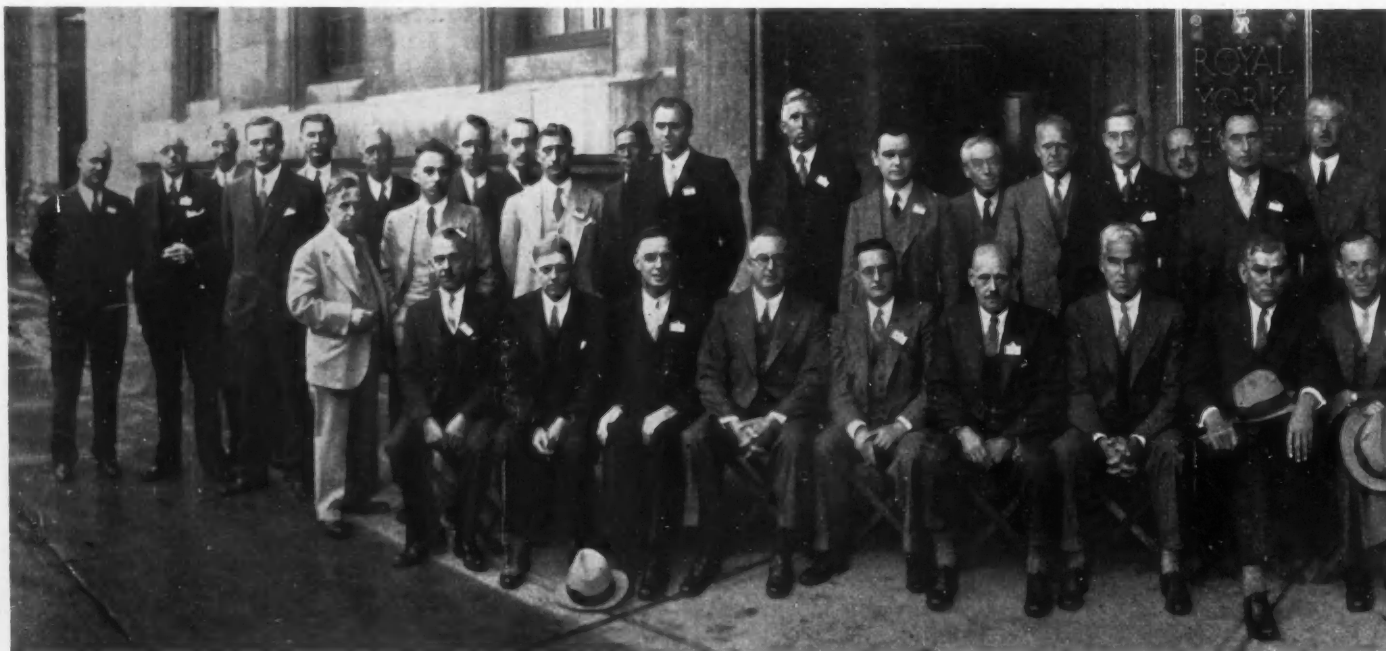
According to His Worship, Mayor W. J. Stewart, if the citizens of Toronto regard the streets as a place

for travel and not as a garage, they should patronize the Toronto Transportation Commission, and they will experience courtesy and at the same time support their own investment. The city is proud of its coach service, which is not only a street asset but also of great value to the province. The mayor spoke with appreciation of the services of the chairman of the commission, William C. McBrien; its engineer, D. W. Harvey; and the able general superintendent, A. S. McArthur, a member of the Society.

Distribution Needs Study and Adjustment

The intervening three years since the meeting of the Society in Toronto in 1929, when the boom broke, and today, when a feeling that good times are returning, were mentioned by Minister Stevens as a most interesting period of universal economic adjustment. He likened it to that of testing a new car or motor-truck by subjecting it to unusual stresses to discover weaknesses and correct them. So now is the time for us, as a democracy, to examine the economic machine.

Production engineering has wrought miracles during recent years, and for this great credit is due to those responsible, but the present fact is that distribution has not kept pace with production, and therein, believes Minister Stevens, lies the greatest economic problem of today. He spoke of the experi-



TYPICAL GROUP OF PARTICIPANTS IN SESSIONS OF THE TRANSPORTATION

ment in Russia to do away with the capitalistic system and of the apparently more hopeless breaking down of the Russian economic system than of the democratic system in North America, where we cling to the main cornerstone of the principle of personal liberty and initiative. But democracy also imposes upon the individual certain responsibilities which, if neglected, may make his lot worse than that of a slave. If members of the Society would bring to bear upon the national problems of their Country the amount of thought that they bring to bear in their daily work, which has achieved miraculous results in the realm of mechanical production,

they would be helping the administrators of their Country.

Attention was invited to the problem of the substantial number of worthy citizens thrown out of employment by the change brought about in industry in the last few years, the choking of the Country with goods and the failure of the distribution system because of the failure to devote to it the study that has been so successful in our various fields of endeavor. One question that must be faced, he thinks, is: How big can an enterprise grow and still be within the capacity of a man's mind? Individual enterprise and reward of merit should be treasured by society.

ers are designing and building truck chassis to closer limits each year, thus permitting a much finer degree of selection and greater assurance of satisfactory service and lower costs than was possible a few years ago.

Mr. Orr does not believe that industry can expect any manufacturer's representative or sales engineer to know as much about the operators' business as the operators' representatives do. Without a definite enough picture of an operator's requirements to permit his isolation of the model in his line best suited for the operator's work, the salesman is at a disadvantage. After operators have been given various manufacturers' recommendations for a certain job, it is necessary for them to compare and study general fitness for the job, unit specifications, performance records, first cost and probable operating costs to assure the best final selection. Mr. Orr does believe that a complete and proper cost-accounting system is basically essential, from which can be obtained the cost per mile, hour or ton-mile, use factor, fuel-economy and the like.

Clinton Brettell, of R. H. Macy & Co., New York City, wrote in part that without question the truck manufacturer, under pressure of keen competition, has, in many instances, not only failed to urge the proper truck for the job in question but also has even recommended a vehicle that he knew was unsuited to the job, simply because he felt that he would lose the order, on a price basis, if he

Transportation Technicalities Treated

Control of Transport Operations and Selling Motor-Truck Transportation Featured

TWO papers compelled lively discussion at the morning session held Oct. 5, which was convened by R. H. Combs, first Chairman of the Canadian Section. The Chairman of the session was T. L. Preble, of the S.P.A. Truck Corp., of Buffalo.

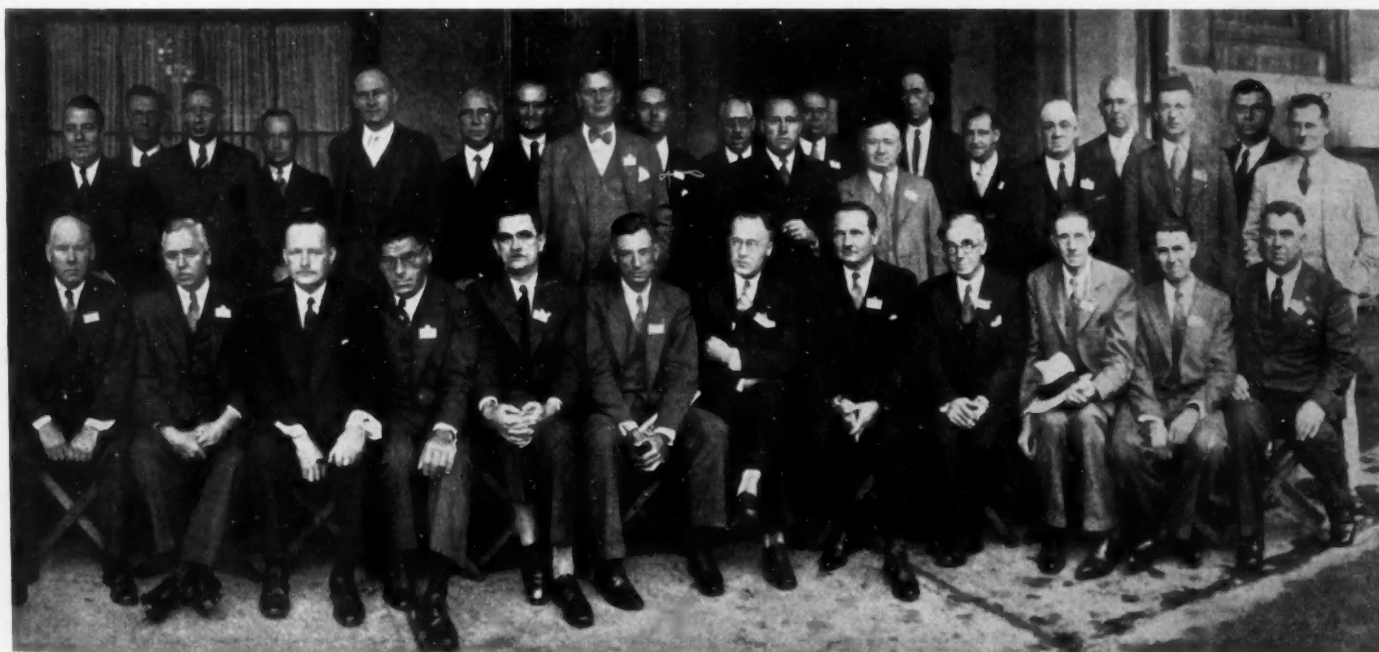
Control of Transport Operations

F. I. Hardy, consulting engineer, of Boston, confined his paper mainly to truck operations, although the general principles he advocated apply largely to motorcoach operation

also. Selection of the right vehicle for the particular work to be done was his major theme. The paper is published in this issue.

Written Discussion Submitted

J. M. Orr, of the Equitable Auto Co., Pittsburgh, stated in part that the selection of a chassis for a particular application is a task to be undertaken only after careful examination of operating requirements and consideration of the many factors affecting a choice. Manufactur-



MEETING—ATTENDANTS AT WEDNESDAY'S SESSION AND LUNCHEON

did not meet the competition truck for truck. He stated also that the factor of weight of equipment to payload ratio is unquestionably one of utmost importance and one that has received little consideration in the past. Some compromise must be reached which will give the benefit of light weight combined with reasonable maintenance cost. He agreed with Mr. Hardy that records for controlling fleet maintenance and operation should be of a form that can readily be understood and employed by all those involved. No record should be prepared or kept *unless it is actually used*; either as a means to further records—an intermediate step—or as a definite item of control. Detailed records should be tied in with master controls.

H. V. Middleworth, of the Consolidated Gas Co., New York City, stated in part that the manufacturers of motor-vehicles have long since realized the importance of placing the right equipment in the right place, but he notes that many men in charge of fleets of motor-vehicles have, through years of experience, become educated to such an extent that they often are able to offer to the manufacturer valuable suggestions regarding the type of equipment best suited to specific operations. His opinion is that a comparison of costs per hour of service is preferable to cost per mile in measuring mechanical efficiency.

Manufacturers Should Heed Operators' Advice

B. S. Snowden, of the General Ice Cream Corp., Schenectady, N. Y., questioned Mr. Hardy's statement that the manufacturers are in a better position to advise operators as to the best types of motor-vehicle equipment. In his position, Mr. Snowden works on the policy that his company will purchase its equipment from the manufacturer who makes the model best suited to the company's requirements. It does not take the manufacturers long, he wrote, to swing over to a model that can be used. His company's trucks are inspected daily; because, if they are allowed to go for 1000 miles in his company's type of work, some repairs would be beyond the minor control and would be in the major classification.

T. C. Smith, of the American Telephone & Telegraph Co., New York City, agreed with Mr. Hardy in emphasizing the need for information

supplied to the purchaser by the vehicle manufacturer to prevent the salesmen from making statements that are not vindicated by the later service experience with the truck. Mr. Smith wonders whether too much emphasis may not be placed upon the responsibility of the truck company's salesmen in supplying the proper truck to do a particular job. Although as much assistance as possible from the truck salesman is needed, it seems desirable for the operator to develop very definite information from his own experience so that he is able to compare truck equipment from the various manufacturers and intelligently select equipment suitable for his purposes.

J. F. Winchester, of the Standard Oil Co. of New Jersey, Newark, N. J., commented on the point that manufacturers should be in a position to give proper advice but have often failed in this and, with adroitness, have covered up the error when selling an incorrect unit for a given job. His idea is that buyers should call for the services of a first-class man who is capable of making an impartial decision after he has analyzed all models of a given manufacturer or makes on the market that can be used for a particular job.

John R. Bingaman, of the Bingaman Motor Express Co., Inc., Reading, Pa., stated in part that, as an operator, he cannot agree that the selection of the vehicle that will best suit the particular need for the operator can be made by any truck salesman. Experience has shown him that the average truck salesman is mainly interested in the sale, and not in the practical operation of the particular vehicle he sells.

Intelligence Test Advocated

In the opinion of W. F. Banks, of the Motor Haulage Co., Inc., Brooklyn, N. Y., an intelligence test should be applied before the transportation business is allowed to start; responsibility and ability should be a requirement for securing a franchise; otherwise, motor transportation will never become stabilized and reach the heights of big business. As for the problem of control, he enlarged upon (a) putting intelligent men in the key positions of management, selling, operating and maintenance; (b) providing the proper tools for exercising intelligent control; (c) establishing job responsibilities and measuring man values by results; (d) holding executive committee

meetings regularly and (e) analyzing operating results, these to be discussed with department heads.

H. E. Hildebrand, of the Bakeries Service Corp., New York City, believes that a fourth item should be added to the three mentioned by Mr. Hardy as things which the manufacturer should do for the motor-truck so that it can take its rightful place in the transportation field; namely, that the manufacturer should not change models too often and thus make obtaining repair parts difficult.

Main Points of the Floor Discussion

Discussion from the floor deviated to some extent from the subject matter indicated by the paper's title. Several, including Chairman Preble, discussed the responsibilities of the various personnel elements in the motor-transport problem. Mr. Preble stated that a good manufacturer's representative must be a keen student of operators' requirements. He feels also that managers and high executives in the sales and engineering departments should spend sufficient time among operators so that the vehicles will satisfy the field requirements. In this connection, he said:

Too many trucks are designed in the office by a man or men who are more or less detached from the field and who work largely from information that comes to them through devious channels. These men should subject themselves frequently to field conditions. They should make technical analyses as to what is needed today and what will be needed tomorrow.

Mr. Preble dramatized one of his points by saying that some features of design are like the pot of gold at the end of the rainbow; that is, a part costing 5 cents may be beautifully designed, but it represents a large maintenance cost—potentially the pot of gold—if this part is inaccessible.

Decision Needed as to Control

Fred Faulkner, of Armour & Co., Chicago, agreed with Mr. Banks that business methods and common sense must be applied to the business of operation. Regarding so-called control, Mr. Faulkner stated that the operator must decide for himself as to what would constitute proper control rather than under-control or over-control. He also commented favorably upon the cooperation that he, as an operator, has enjoyed from the manufacturers.

F. K. Glynn, American Telephone & Telegraph Co., New York City,

feels that the manufacturers are doing a "fair" job of cooperation with the operators. He suggested that the manufacturers should draw qualified men from field operations so that they can represent the manufacturer intelligently and understandingly in the contacts that the manufacturer makes with his prospects among operators. He stated that idle time is a real element in the problem of economical fleet operation. He believes that a fleet can be operated with practically no idle hours.

Mr. Glynn cited cases where control records are useful to the operator in inverse ratio to the amount of detail they convey. He believes that the fleet operator requires a comparatively small number of entries so long as the items that are recorded are the vital ones which give a true picture of the operation. He stated that time instead of mileage should be the basis for inspection.

A. M. Wolf, consulting engineer, New York City, said that the commercial-vehicle manufacturer's proving ground is found in actual operations. He believes that the manufacturer and his important men should visit this proving ground and become fully familiar with what is going on there. L. R. Buckendale, Timken-Detroit Axle Co., Detroit, remarked that the designing engineer establishes his contact with the field through the mediums of personal contact, the service department, technical men in the field and the field selling forces. The picture is often distorted by the time it reaches the designing engineer, he said.

Three Methods of Design

M. C. Horine, International Motor Co., Long Island City, outlined three methods of design; (a) by a genius in a closet according to ideal requirements; (b) by the sales-department market analyses, determining for the engineer what the buyer wants and (c) research by the engineer in the field to determine what the buyer actually needs. The ideal method, according to Mr. Horine, is to determine the need of the operator. This calls for field engineering and close cooperation between the manufacturer and the user. In closing he stated that the salesman is a mirror of the buyer.

Comments by F. I. Hardy

Mr. Hardy, in commenting upon the discussion, stated his belief that great chaos in commercial-vehicle op-

erations is caused by small operators; this includes responsibility for many of the unwise regulations now in effect. He believes that elaborate records are not necessary; they should hit the high spots, but he thinks that a right system with medium brains is preferable to no system with plenty of brains. He again emphasized that lack of accessibility in design is responsible for great trouble with parts because they do not receive prompt attention. He stated that manufacturers are very glad to correct troubles if they are confronted with proper, reliable and

ally accepted meaning, has a worthy part. In this field the truck has won its present position by a combination of its inherent advantages and aggressive promotion of its use by manufacturers, shippers and the haulage industry. This progress has been made without the benefit of franchise, subsidy or any other special privileges and in spite of progressive taxation that now includes the vehicle, tires, fuel and oil, and licenses to operate and drive.

Merchandising this form of transportation was divided by Mr. King into sale of the truck itself and sale



F. I. HARDY



J. M. ORR



H. JOHNSON-TIGHE

intelligent information from operating records. He thinks that the manufacturer has a real responsibility in reducing vehicle weight and that the operator should give actual facts in this respect to assist the manufacturer.

L. V. Newton, Byllesby Engineering & Management Corp., Chicago, mentioned the work that has been in progress since 1928 in the Society and the National Electric Light Association, in which he has been particularly interested, which has brought about improvements in cost-accounting methods through the adoption of cost-accounting forms. He stated that chronic failures can be found without cost accounting; but, he said, "we must know costs if we are to succeed."

Selling Motor-Truck Transportation

R. D. King, of Metropolitan Distributors, Inc., New York City, brought out in his paper that before anything can be shipped by motor-truck, the shipper must be convinced that the most economical and expeditious means of moving goods from place to place is by motor-truck. Where a choice of means of transportation exists, selling, in its gener-

of transportation as a service. Requisites for the former include a grounding in the principles of truck engineering and operation, hence salesmen have been trained in analyzing truck users' requirements, fitting the vehicle to the job, promotion of preventive maintenance and care of the vehicle, and, finally, in replacement of the truck when its economical life is ended.

In discussing Mr. King's paper, F. C. Horner, General Motors Corp., New York City, contended that salesmen should know the fundamentals of the operators' problem. He stated that a salesman or factory representative has a decided advantage with the operator if he can convince the latter that he knows the operator's requirements and thus is able to sell him a suitable vehicle. He believes that the problem is about 50 per cent one of design, material and workmanship and about 50 per cent one of suitable application of the vehicle to the operation.

In studying operations, Mr. Horner feels that scientific attention should be given to four basic factors; namely, load, haul, loading and unloading.

(Continued on p. 31)

The Fundamentals of Transportation

TRANSPORTATION bears the same relation to the body economic that the blood system bears to the body physical. Arteries do not run to the fingers and toes, nor can rail or waterways reach to the home, farm or even the majority of industrial plants.

Highways connecting these units with one another form a means of communication but, prior to the advent of the motor-vehicle, were limited in usefulness because of limitations of speed and bulk capacity. Waterways provide capacities for bulk hauling but lack speed; railways provide both but in common with the waterways, cannot tie these ultimate units together.

The motor-vehicle on modern highways performs a service that cannot be duplicated by any other form of land or water transportation. Therefore, it is not in competition with these other forms of transport, as it provides facilities which they cannot duplicate.

Roads are public property available for the use of everyone. Improved roads and motor transport bring people and communities closer to railroads and each other. In consequence there results increases in property value and a

greater dispersion of the population, which provide more satisfactory living conditions.

The capital cost of roads is in part a permanent value that should be carried by the whole public. The cost of renewal and maintenance of the structures should be borne by the users. The present system of motor-vehicle taxation provides for this.

Legislation leading to the restriction of road transport will retard progress, increase congestion in population, reduce the value of farm products, increase cost to the consumer and should, therefore, be recognized as contrary to the public good.

Restriction is not the tool of development. Growth is necessary to meet the desire of each individual for improvement in his personal conditions of living. This improvement is the foundation on which increased production of all commodities and increased use of all services are based. Therefore, it is evident that, to improve the earning capacity of the individual, the manufacturer and the railroads, we need, instead of restriction, greater development in the use of motor transport. This development should be in the direction of a better coordination of rail and highway transport, so that each may render better and cheaper service by itself in cooperation with the others.

It is the duty of the motor-vehicle industry to develop and present this viewpoint to the public. This is not only for self-interest but in the interest of everyone.

Sincerely yours,



Vice-President, Engineering Division,
Autocar Co.

B. B. BACHMAN



S.A.E. Vice-President
Representing Motor-Truck and
Motorcoach Engineering

What's Next?

A. S. McARTHUR



S.A.E. Vice-President
Representing Transportation and Maintenance Engineering

WITH the return to normal conditions, further opportunities for advancement in transportation will be presented, as the buyer of movement, be he traveler or shipper, always wants the best.

The great selling point for the motor-vehicle has been convenience; but, with this, reliability must be assured, and safety requirements demand easy and complete control. The maker and the operator have carefully studied every feature of the vehicle and have particularly applied its suitability for the work to be done, quiet power to carry it out, and attractiveness to get business.

Maintenance, although sometimes a drab word, is still basic to transportation and still a vital problem.

The business use of the motor-vehicle can be accelerated by building and working the vehicle to reduce the cost of operation. This appears to be clearly defined as a trend of future development and has most forcibly been brought home to all users during the recent difficulties of operation.

Tremendous efforts have been made to fit equipment to new uses, and new uses have been found; however, the responsibility of all highway users does not end with this. Transportation on the highway urgently needs the combined support and future guidance of all manufacturers, operators and users.

Cordially yours,

A handwritten signature in cursive script, appearing to read 'A. S. McArthur'.

General Superintendent,
Toronto Transportation Commission

Production Men Discuss Weighty Subjects

Hold Pressure Needed to Bring Weight Reductions—Economy in Tooling and Equipment-Replacement Program

THE Production Session of the Society in Buffalo on Oct. 3, of which an advance account was given in the October issue of the S.A.E. JOURNAL, was held as planned and was well attended.

In a companion paper to that of Alex Taub's on manufacturing equipment to meet the automotive designer's needs, L. F. Maurer stated that a majority of designers who answered an inquiry on the subject stated that the greatest need was for flexibility or versatility in tools and equipment. The making of desirable improvements in products frequently has been postponed even in good times because of the excessive expense involved in changing special-purpose machines having fixed centers. However, equipment manufacturers have made marked improvement in both standard and special-purpose machines so that alterations can be made much more quickly and at less cost than formerly. He outlined briefly some of the improvements in tooling, equipment and methods for which the designer is now looking and stated that in the next five years we may see rather radical changes in the automotive industry, some of which may even threaten the existence of present manufacturing methods. Great progress, said Mr. Maurer, has been made along the line of building dies in sections so that, in cases of design changes, only certain parts need altering, and also a number of different models can be made from the dies by using certain changeable die sections.

Present Vehicle Weights Are Critical

Mr. Taub's paper, published in the October issue of THE JOURNAL, was excellently presented by L. P. Saunders, chief engineer of the Harrison Radiator Corp., Lockport, N. Y., who said with reference to the vital question of weight reduction that an old maxim is to the effect that "if you cannot add brains, add weight." His remarks led to a spirited discussion of the weight-reduction problem. M. A. Thorne, experimental engineer of the Pierce-Arrow Motor Car Co., Buffalo, stated his opinion that excess weight in present automobiles is critical, all cars on the road weighing too much. Vice-President J. E. Padgett stated that weight will be reduced by the manufacturing unit of the plant upon which greatest pressure is brought to bear. He gave several examples indicating that otherwise a designing or production organization ordinarily will not strive effectively for weight reduction. In one case a rear axle was reduced in weight from 125 to 96 lb. and the original rigidity doubled. President Scaife pointed out the premium placed by State legislation on weight conservation in motor-trucks.

Commenting upon Mr. Taub's observations regarding jigs and fixtures, Mr. Padgett remarked that he had found it profitable and economical to build fixtures of steel instead of cast iron, as they are lighter, more adaptable and more easily changed to accommodate design changes. To illustrate, he mentioned

that new dowel locations can be made more easily, as welding enables the manufacturer to change his fixtures quickly and cheaply. In Mr. Padgett's opinion, jigs and fixtures should incorporate a major portion of the flexibility required in a given operation, and in many cases the machine itself should be regarded only as a driving unit connected through universal-joints to the cutters.

Others who discussed the Production Meeting papers included R. W. A. Brewer, Erik Oberg and J. E. Geschelin.

At the joint luncheon of the S.A.E. and the American Society of Mechanical Engineers, K. H. Condit, McGraw-Hill Publishing Co., New York City, addressed the gathering on the subject of the economic aspects of planning an equipment-replacement program at this time. The major part of the address is published in this issue of THE JOURNAL in the Production Engineering department.

Committee Plans Annual Meeting Production Session

During the Production Meeting the Production Activity Committee held a meeting in Buffalo on Oct. 3. Those in attendance were Vice-President J. E. Padgett, E. P. Blanchard, Joseph Geschelin, E. T. Larkin, Erik Oberg, E. L. Sawyer, E. R. Smith and General Manager John A. C. Warner.

The Committee discussed plans for a Production Session to be held during the Annual Meeting.

Aircraft Engineers
Airplane-Engine Designers
Airship Designers
Assembly Engineers

Battery Engineers
Body Designers
Body-Hardware Designers
Body-Stampings Designers
Bumper Designers

Chassis Designers
Chief Inspectors
Chemical Engineers
Clutch Designers
Consulting Engineers on Auto-
motive, Electrical or Mechanical
Problems

Diesel-Engine Designers
Draftsmen
Dynamometer Operators

Efficiency Engineers
Electrical Engineers
Executive Engineers
Experimental Engineers

Fleet and Maintenance Operation
Managers and Engineers
Fuel and Lubricant Engineers
Fuel-Injection Research Engineers

Gear Designers

Highway-Equipment Designers
Hoist and Dump Body-Designers

Instrument Designers

Machinery Designers
Magnetos, Distributor or Ignition
Designers
Metallurgists

Passenger-Car Designers
Personnel Men
Plant-Layout Engineers and Man-
agers

Production Engineers
Professors of Engineering Subjects
Propeller Designers

Radio-Apparatus Designers
Rail-Car Designers
Road-Test Engineers

Sales Engineers
Sales Directors
Service and Sales-Promotion En-
gineers

Spark-Plug Engineers
Stress Analysts
Superintendents of Plants, Engi-
neering Departments and Pro-
duction

Technical Engineering Editors
Tire Designers
Tire-Machinery Designers
Tool Designers
Transmission Designers

Transportation Engineers
Truck Designers
Truck-Trailer Designers
Wind-Tunnel Designers

HELP!

WHERE there is smoke there must be fire. The smoke of industrial activity is on the increase. Not only has this found expression in the growing optimism, but also in reliable analyses of business conditions.

With this growth of business will come an inevitable increase in the personnel of all organizations. The need will be for trained men, men qualified to take their places efficiently in many important organizations.

The S.A.E. Employment Service seeks the opportunity to put you in touch with well qualified men when vacancies occur in *your* organization—men stamped with the hallmark of engineering education and experience, S.A.E. membership.

Employers will be interested to note the range and variety of qualifications that characterize the Society's lists.

S. A. E. Employment Service

Chronicle and Comment

Sections Working on Employment

WITH the conviction that every possible service must be extended to the membership, the Society's officers are doing everything within their power to assist in locating positions for members who are without company connections. Under present circumstances, the available openings are far too few, and to direct worthy talent toward opportunities that do not exist is impossible. However, efforts to fill the jobs that are available with men from the S.A.E. ranks are being pushed.

President Scaife has directed strong appeals for assistance to important executives and others in the industry. The response to these appeals has indicated a general desire to cooperate fully with the Society's membership and to use S.A.E. members so far as possible to fill any vacancies that may arise.

An important part is now being played by our Sections, many of which have organized their local work to supplement the campaign of the parent organization. With this concerted action every reason exists for believing that the S.A.E. membership will be fully in line for consideration when automotive business gets into its stride again.

Elsewhere in this issue an idea is given of the range of high-class talent that is available. Employers are again urged to take full advantage of these possibilities.

Good Housekeeping

As stated repeatedly in these columns, the Society's Council has consistently backed the policy of continuing every possible benefit to the membership, at the same time keeping the financial condition of the organization in good business order. At frequent periods these matters have been the subject of careful review by our Finance Committee and the Council, and a great many desirable economies have been effected to meet the contingencies of a reduced income. Members who have had experience with measures for saving in industrial organizations know what *good housekeeping* means. The best of such measures, in the judgment of our officers, have been applied to the Society's operations. Splendid cooperation in these efforts has come from the Sections, and it is pleasing to discover that the great bulk of the constructive work of both parent organization and Sections can be carried along very satisfactorily and in many instances with greater effectiveness than has been the case in periods of normal business activity.

Annual Dinner Comes Next

DURING OCTOBER, two general meetings of the Society were held successfully: Production, in Buffalo; and Transportation, in Toronto.

Our next big event will be the Annual Dinner on Jan. 12, 1933, in New York City, and following it the Annual Meeting in Detroit, Jan. 23 to 26. Every indication gives promise that these important affairs will establish new standards of excellence. Already the various committees are busily engaged in arranging the programs and soon the details can be definitely announced.

The 1932 Annual Meeting broke all previous records for attendance at a technical meeting of the Society. The 1933 gathering should be even better.

Detroit Section Provides "More for the Time Spent"

AN attractive new model recently produced by our Detroit Section has been received with great favor by members interested in the Section's five major activities. Until recently it has been difficult for the officers to arrange a sufficient number of local meetings to satisfy fully the divergent demands for papers on passenger cars, bodies, aeronautics, production and matters of special value to students. But Chairman E. V. Rippingille and his officers have worked out a *group meeting* plan that offers an excellent solution of the problem.

The initial group meeting on Oct. 10 demonstrated the practicability and popularity of the scheme. An evening of events opened with a dinner, attended by more than 200 members and guests, at which Chairman Rippingille presented a short address of general interest to all members of the Section. Following this, John Votypka, Vice-Chairman for the Body Activity, corralled 125 members who held a body session; Vice-Chairman for the Aeronautic Activity, Ralph Du Bois, took his group of more than 200 to listen to a paper of special interest to them; and Vincent Rumely, Production Vice-Chairman, had a following of 75 for the production session. Obvious conclusions can readily be drawn from the fact that 400 attended this meeting of meetings.

Detroit is to be commended for inaugurating this excellent plan, which is bound to benefit the Section and the Society membership in general.

Good News for Production Men

VINCENT RUMELY, Detroit Section's Vice-Chairman of the newly formed Production Activity, promises to give automotive production men considerable to think about during the 1932-1933 season of Section work. Beginning with an excellent session on Precision Boring, the year's program will include a group of high-powered discussions of real manufacturing problems *hot from the shop*.

Special mention is made of this new activity because undoubtedly it will satisfy a most important demand of technical men of the highest order. Through the further promotion of the production man's best interests, the Detroit Section will augment the Society's usefulness to the industries that it serves so effectively.

Syracuse Section Joins Technology Club

SYRACUSE is justly proud of its Technology Club, an organization founded under the guidance of Prof. John E. Sweet in 1903. Eight technical and engineering Societies are affiliated with the Club, the latest addition being the Syracuse Section of our own S.A.E. Our members in Syracuse, under the leadership of Chairman L. W. Moulton, feel that their new connection will make available to the local members many useful facilities and educational opportunities that could not be provided if the Section were to continue to operate independently.

The first meeting of the local S.A.E. group with the Technology Club, held on Oct. 10, was attended by 167 persons.

Standardization Progress

IN January this year an important revision of the S.A.E. Standard for Ball-Bearing Lock Nuts and Washers, originally adopted in 1931, was approved, making the threads on the shaft and in the nut uniform with the pitches of American Standard screw-threads and establishing the thread dimensions and tolerances in the Class-3 fit. The present standard to which the revisions now proposed apply is printed on pp. 86 to 90 of the January, 1932, edition of the S.A.E. HANDBOOK.

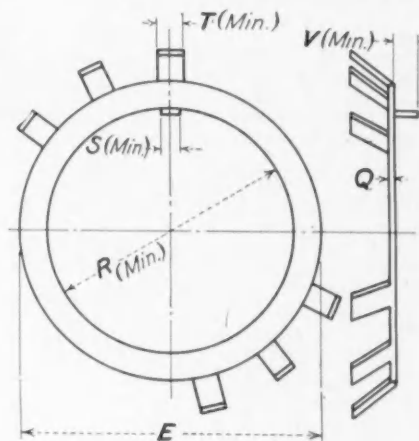
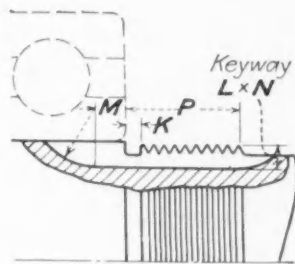
Further study of the entire standard has been made by a Subdivision of the Ball and Roller Bearings Division of the Standards Committee and has resulted in a number of proposed revisions to conform to improvements developed by the bearing manufacturers since the standard was originally adopted.

Keyway lengths and widths have been repropotioned for several sizes.

Ball-Bearing Lock Nuts and Washers

Revisions of S.A.E. Standard Proposed by Subdivision Will Provide for Uniform Practice

the thread-clearance groove in the shaft has been relocated to strengthen the holding power of the locking washer-key in the keyway, the thread-length dimension on the shaft has been relocated and revised to conform



to thicker nuts in the larger sizes; the bore of the large-size nuts has been changed to permit of full depth of threads in the nuts, the thickness of the

PROPOSED BALL-BEARING LOCK-NUT AND WASHER DIMENSIONS

S.A.E. Lock Nut No.	Proposed New Dimensions				Proposed Revised Dimensions					
	Washer Bore <i>R</i> (Minimum)	Washer Key		Tang Width <i>T</i> (Minimum)	Nut Bore <i>B</i>	Nut Width <i>D</i>	Thread Groove <i>K</i>	Keyway		Thread Length <i>P</i>
		Width <i>S</i> (Minimum)	Projection <i>V</i> (Minimum)					Width <i>N</i>	<i>M</i>	
0	0.406	0.115	1/16	0.093	0.357	Present Standard	1/16	Present Standard	3/32	9/32
1	0.489	0.115	1/16	0.093	0.435		1/16		3/32	3/8
2	0.606	0.115	1/16	0.115	0.552		1/16		3/32	3/8
3	0.684	0.115	1/16	0.115	0.630		1/16		3/32	13/32
4	0.801	0.156	1/16	0.156	0.747		1/16		3/32	7/16
5	0.089	0.156	3/32	0.156	0.935		1/16		1/8	15/32
6	1.199	0.156	3/32	0.156	1.112		1/8		1/8	15/32
7	1.406	0.156	3/32	0.156	1.315		1/8		1/8	1/2
8	1.625	0.250	3/32	0.219	1.502		1/8		1/8	1/2
9	1.813	0.250	1/8	0.219	1.706		1/8		5/32	1/2
10	2.000	0.250	1/8	0.219	1.907		1/8		5/32	9/16
11	2.188	0.250	1/8	0.219	2.096		1/8		5/32	9/16
12	2.406	0.250	1/8	0.219	2.299		1/8		5/32	19/32
13	2.594	0.250	1/8	0.219	2.487		1/8		5/32	5/8
14	2.813	0.250	3/16	0.219	2.690	1/8	1/4	5/8		
15	3.000	0.250	3/16	0.313	2.842	Other Dimensions Same as Present Standard	5/32	Other Dimensions Same as Present Standard	1/4	11/16
16	3.188	0.313	3/16	0.313	3.046		5/32		1/4	11/16
17	3.406	0.313	3/16	0.313	3.249		5/32		1/4	23/32
18	3.594	0.313	3/16	0.313	3.436		5/32		1/4	25/32
19	3.781	0.313	3/16	0.313	3.639		5/32		1/4	13/16
20	4.000	0.313	1/4	0.313	3.827		5/32		5/16	27/32
21	4.218	0.313	1/4	0.375	4.031		5/32		5/16	27/32
22	4.406	0.313	1/4	0.375	4.234		5/32		5/16	29/32
24	4.813	0.313	1/4	0.375	4.625		5/32		5/16	15/16
26	5.218	0.375	1/4	0.500	5.015		7/8		5/32	5/16
28	5.594	0.500	1/4	0.500	5.406	1 3/16	5/32	5/8	5/16	1 5/16
30	6.000	0.500	5/16	0.500	5.797	1 1/4	5/32	5/8	3/8	1 13/32
32	6.375	0.500	5/16	0.500	6.148	1 9/32	1/4	5/8	3/8	1 7/16
34	6.781	0.625	5/16	0.500	6.523	1 11/32	1/4	3/4	3/8	1 1/2
36	7.156	0.625	5/16	0.625	6.930	1 13/32	1/4	3/4	3/8	1 9/16
38	7.563	0.625	5/16	0.625	7.336	1 13/32	1/4	3/4	3/8	1 9/16
40	8.000	0.750	5/16	0.625	7.711	1 1/2	1/4	7/8	3/8	1 21/32

large-size nuts has been increased in proportion to the shaft and bearing sizes and detail dimensions have been added to the locking washers to provide for interchangeability and for purchasers' inspection.

The revisions now proposed are shown in the accompanying illustrations and table, all other dimensions remaining as now printed in the

HANDBOOK. The report is published in this issue of THE JOURNAL to afford manufacturers and users the opportunity to review it and submit any constructive suggestions or comments to the Standards Department of the Society before the proposed revisions are acted on by the Division and submitted to the Society for adoption and publication in the S.A.E. HANDBOOK.

Automobile-Radio Standards

R.M.A. and S.A.E. Committees Discuss Recommendations and Appoint Subcommittees

RECOMMENDATIONS for automobile-radio installations, prepared by the Automobile Radio Committee of the Radio Manufacturers Association, Inc., were discussed at a meeting of the S.A.E. and R.M.A. Committees, held at the Book-Cadillac Hotel in Detroit on Sept. 16. The meeting was attended by 11 members of the Society representing car and accessory manufacturers and the Radio Association delegation was composed of representatives of 18 radio and battery companies. Acting Chairman Virgil M. Graham, of the R.M.A. Committee on Automotive Radio, presided.

After discussing the question of the operating temperature of electrolytic capacitors in receivers mounted in engine compartments, a subcommittee of which A. A. Leonard, of the Philadelphia Storage Battery Co., is chairman, was appointed to study this problem and report to the joint committees.

Discussion of the mounting location of the radio receiver and the speaker brought out the statement that this affects both the car body and the chassis and that body and chassis engineers should be consulted before any decision is made. The possibility of mounting the speaker in the engine compartment, using the bulkhead as a baffle, which would require about an 8-in. hole in the bulkhead, was discussed, and the fact was brought out that results from the loud speaker are better as its size is increased. A subcommittee, of which R. C. Stinson, of the Chrysler Corp., is chairman, was appointed to work out recommendations as to size and location of mounting space and standard mounting-dimensions for the receiver and the speaker.

Ignition Equipment and Suppression

Because the ignition switch should be near the radio controls so as to provide for the installation of anti-automobile-theft locks, the section of the R.M.A. Committee recommendations covering ignition equipment was revised and adopted.

As the spiral steel armor used on ignition-lock cable was said to act more

as a radio choke than as a shield, the suggestion was made that some shielding could be put over the steel spiral; also that solid pipe of any metal provides a satisfactory shield.

Regarding ignition suppression, the statement was made that better alignment between the rotating and stationary electrodes of the distributor is desirable to avoid radio disturbance. Reduction of the suppressor resistance to 10,000 ohms from the original value of 20,000 to 25,000 ohms was proposed, but those present agreed that the radio-frequency impedance of the suppressors should be kept high.

The furnishing and installation of ignition-suppression equipment by the automobile manufacturers on all cars was discussed because the ignition systems cause interference with commercial communication channels. The original recommendation covering ignition suppression was revised and adopted, as was also that covering wiring and generator.

A subcommittee headed by A. Crossley, of the Howard Radio Co., was appointed to study both the radio-frequency test and the production test for automobile-radio antennas.

Battery-Current Allowance

Because of a difference of views between the radio and the car manufacturers regarding the maximum battery current that should be allowed for radio installation, a subcommittee headed by C. F. Gilchrist, of the Electric Auto-Lite Co., was appointed to study the problem of current drain for radio receivers and also the matter of uniform practice in the grounded polarity of the car battery.

When the various subcommittees have completed their studies, their recommendations will be referred to both the S.A.E. and the R.M.A. Committees, and, after the latter have considered them, they will be published to give both industries an opportunity to consider them and to offer constructive criticism before they are finally adopted.

25.4 Recommended as Inch-Millimeter Conversion Factor

GREAT progress toward a world-wide standard of considerable importance was made at a general conference of industrial and governmental representatives in New York City on Oct. 21, when it was recommended that for all industrial purposes the conversion factor 1 in. = 25.4 mm. be adopted for use instead of the exact ratio 25.40005 which is derived from the official relation 1 m. = 39.37 in. The difference in results between these two factors is only 2 parts in 1,000,000, which is negligible for practically all industrial applications and will have no effect on the correct fitting of parts or their interchangeability. The intention is that the factor 25.40005 be used only where very accurate conversions are required in scientific determinations.

The conference also recommended that the factor 25.4 become effective as American Standard on Jan. 1, 1933, or as soon thereafter as ratification is completed under American Standards Association procedure. The report, when published, will contain conversion tables for inches to millimeters up to 100 in., millimeters to inches up to 100 mm. and binary fractions of an inch to decimals and to millimeters to six decimal places.

The accurate method of calculating conversions both ways and a general rule for the number of decimal places to be retained are included in the report so that variations in calculations can be avoided.

Finally, the report gives the following method of "rounding off" decimal values, especially in sequences of calculations. When the figure next beyond the last figure to be retained is less than 5, the last figure retained should not be changed. When the figure next beyond the last figure to be retained is greater than 5, the last figure to be retained should be increased by 1. When the figure next beyond the last figure to be retained is 5 with only ciphers following, the last figure retained, if even, should not be changed but, if odd, should be increased by 1. This method will give an accurate average in the final result, whereas the final result will be low if the last figure retained is not increased when the figure dropped is an even 5, or the result will be high if the last figure retained is always increased by 1.

As the above recommendation by the conference is subject to ratification by the member bodies of the American Standards Association, comments on the recommendation should be submitted to the Standards Department of the Society promptly before official action is taken by the S.A.E. Standards Committee and Council on subscribing to the recommendation as an American Standard.

Production Engineering

FORTUNATELY,

Evidences that the business tide has turned are multiplying and we can therefore consider adjustments of policy to a condition that is radically different from that of even three months ago. Before doing that, suppose we review what happened during the previous two years.

Suppose we start with the automobile industry, because its equipment and methods are supposed to be so far ahead of those of other and older branches of metal working. As a matter of fact they are ahead, but even so they leave something to be desired.

One of the older companies making a high-priced car has an announced policy of spending not one unnecessary cent for maintenance of equipment. When a machine in the production line breaks down, it is looked over to see if it can be repaired for less than \$200. If not, out it comes and a trip is made to the surplus-machinery storehouse to see what can be tinkered up inexpensively to plug the gap.

Another automobile company, building low-priced cars, has a current policy of liberality toward repairs but prohibition so far as new machinery is concerned. In desperation the superintendent ordered practically complete sets of parts for two machines that he could not get along without and assembled them himself. And how it does waste money!

One of the big body companies has followed the policy of careful attention to maintenance where safety is involved and of letting everything else go.

Bankers Barred Purchases

A steel company asked for bids on the repair of 20 wire-drawing chucks that were rather well battered. The shop that got the order bid \$35 apiece. Its manager was conscientious enough, however, to point out to the steel-mill superintendent that he could get new and better chucks at \$45. His answer was that his board of directors, on which were several bankers, had issued an edict that not a cent could be spent for new equipment but that he had a blanket requisition to get those chucks repaired and that the contractor had better go ahead and make a profit while he could.

A few weeks ago in New England a boring mill was being figured on. The new one would save its cost in four years, even at the current low rate of activity. The president of the company which needed it was also a bank president, unfortunately. He vetoed the requisition because it was against his fundamental principles.

¹ M.S.A.E.—Publishing director, *American Machinist and Product Engineering*, New York City, in an address at the Production Meeting luncheon session of the S.A.E. and the American Society of Mechanical Engineers in Buffalo, Oct. 3, 1932.

Should Readjust Equipment Policies

Plan for Replacement of Obsolete Machines Before Normal

Conditions Return, Says K. H. Condit¹

Bad as has been the effect of panic on equipment-replacement programs, a more dangerous if less noticeable effect has been produced on the morale of production executives. A typical example will prove the point. It was told to me by a New York City machinery dealer.

For five months this dealer has been working with the production men of a large machinery organization on a deal for three special machine-tools. The order was finally signed and sent to the financial heads for approval. It was rejected. The dealer was much disappointed but did not give up without a fight. With the entire approval of the production men, he took the case to the financial heads. There he made his argument on the ground that the \$60,000 involved in this order meant real unemployment relief because the machines had to be designed before they could be built. His argument scored, for he was told that, if the production men were convinced that the three units would make a real saving in production costs, the order would be signed.

Two weeks later he got word that the production men had reported that they could get along without them. What had happened? Just this. These men had suffered four salary cuts. They had been pounded for months with the demand for more and more economies. The sin of spending for new machinery had been dinned into their ears. It looked more important to them to hold their jobs than to risk them by going against their superiors, even though the company would profit thereby.

Should Study Successful Equipment Policies

From the foregoing it seems evident that equipment policies have been adjusted to the vanishing point during the painful period from October, 1929, to October, 1932. What is to happen to them now?

Assuming that we are two or three months along the road to recovery, those companies that had successful equipment policies will be thinking about adjusting them back to normal. Those that never had any will do well to study the successful plans and work out ones that will meet their own needs. A very simple plan that may well be taken as a point from which to start is that of retiring 10 per cent of the production equipment in the plant each year.

Companies that followed this plan for a reasonable period before 1929 found themselves in excellent shape to weather a storm. They could even abandon it altogether for the emergency and still be

in far better shape than their competitors. The operator of such a plan recently admitted that he had been compelled to drop it during the last 18 months but said that he was able

to do what work he had on thoroughly modern machines and at minimum cost. He stated that not a tool in his milling and turning department has been built before 1925. Two years ago the average age of all his equipment was about six years. Compare that with the average for the industry. According to the *American Machinist* survey of obsolete equipment conducted in 1930, 48 per cent was more than 10 years old. The average life, therefore, was somewhere near 20 years. Today it is certainly more than 22 years, because so little equipment has been purchased since 1930.

Virgil Jordan, economist of the *Business Week*, estimates that the deferred purchases of production equipment of all kinds—metal-working, powerplant, textile, food, leather, woodworking, and so forth—reaches the staggering sum of more than \$30,000,000,000. At the normal rate of annual purchasing, something like \$4,000,000,000 worth a year, nearly eight years would be needed to make up the deficit. And to that you would have to add the amount necessary to keep current equipment up to date during that period.

Funds for Financing Replacements

With such a situation to face, intelligent, farsighted equipment policies must be worked out and put into effect by American industry.

Back of any equipment policy must lie adequate resources. The best policy in the world gets exactly nowhere if the directors can take the equipment reserves and mistake them for divisible surplus. In our present situation, funds for replacement equipment will be difficult to find. The larger companies can finance replacements whenever they feel that it is safe to risk some of the precious liquidity condition that has been the creed of the creditor bankers these many months. For smaller manufacturers the solution may be a machinery credit pool or financing organization something like the Railroad Equipment Finance Corp. recently formed.

Purchasing Practice Needs Revision

I am hopeful that eventually enlightened self-interest will take the place of the stupid selfishness that has characterized equipment buying for so many years. The practice of the purchasing agent long has been to beat down the price of the equipment seller by any means at his command. If this process is carried to its ultimate conclusion, the buyer will eventually cut himself off from the source of supply of the

(Concluded on p. 29)

Transportation Engineering

Subcommittee Report on Ventilation

Covers Gas-Odor Elimination from Motor-Vehicles and Motorcoach Ventilation

THE report was made by the Subcommittee on Motorcoach and Motor-Truck Ventilation; namely, by W. J. Cumming, Chairman, and by members B. V. Evans, A. A. Lyman and E. S. Pardoe. It states that:

The officially assigned title of this Subcommittee is confusing to the motor-vehicle operator, for ventilation means to him, first of all, the elimination of gas odors from the coach body or truck cab, while, to the public, it means, no doubt, simply proper interior ventilation.

Since we all are of the opinion that nothing should be left undone to eliminate the stigma against motorcoaches which has arisen because of their characteristic odor, the necessity for adequate interior ventilation becomes obvious. All of our investigation over millions of miles of operation indicates that there is no one cause of fumes and certainly no single cure.

The Causes of Gas Fumes

Gas and burning-oil odors in motor-vehicle bodies and cabs, commonly known as "gassing," are generally attributed to the following causes:

- (1) Leaking exhaust systems
- (2) Leaking heating systems when direct exhaust heat is used
- (3) Imperfect crankcase ventilation
- (4) Dirty and oily engines
- (5) Collection of exhaust fumes under low body-skirts because of short tail-pipes
- (6) Poor engine carburetion
- (7) High vacuum in intake manifolds at low speeds
- (8) Improper accelerator manipulation by the vehicle operator
- (9) Poor engine maintenance

Gas Fumes Due to Leaks

One very effective method of eliminating leaks in the exhaust-piping systems, including the muffler connections, divides the entire exhaust piping from manifold to tail pipe into standard flanged lengths, the flanges welded to the pipe being jointed with copper and asbestos gaskets and $\frac{1}{2}$ -in. bolts.

In redesigning any exhaust system, care should be taken that no excess back pressure is built up. A check with a back-pressure gage is the correct method of determining whether the proper condition exists.

Motorcoach or truck-cab heating by the direct exhaust method of diverting exhaust gases through piping in the body should be eliminated by all operators at the earliest possible date, because of the hazard involved.

Fumes Due to Engine Conditions

Motorcoach operators have experienced great annoyance from crankcase fumes. Because of the nature of the usual design of engine, it has been

practically impossible for the vehicle operator to build into his existing engines a thoroughly efficient system for carrying off crankcase fumes under all operating conditions. Since vehicle manufacturers have been backward in the development of efficient crankcase-ventilating systems, we feel that designers should give thought to this very important problem. Further, such apparatus should have a very beneficial effect on the sludge problem, from which many manufacturers are now suffering in their larger-type-engine units.

Under certain conditions engines that accumulate heavy deposits of oil and dirt give off disagreeable odors. Some operators find that cleaning their engines periodically is very beneficial. The psychological effect of clean engines on maintenance forces has a certain value.

Exhaust-Pipe Location

Many operators have carried on extensive experiments with exhaust stacks on both single and double-deck motorcoaches and trucks; and, although in some instances the results may have been satisfactory, in most operations the disadvantages have been found to outweigh the advantages. In operation the following, among other conditions, have developed: Unfavorable winds carry the exhaust gases back into the body of the vehicle and the exhaust noise is more objectionable, particularly in narrow city streets.

Tail pipes should be extended beyond the rear body lines and directed downward and outward and preferably to the left.

Adjustment of Carburetion

In many cases manufacturers have attached too much importance to high-speed performance and, in an effort to obtain greater power, have sacrificed fuel economy and aggravated the exhaust-fume problem.

Hundreds of checks with a number of types of air-fuel-ratio meter show that most motorcoaches are operating with efficient high-speed carburetor settings, but low-speed and idling settings are exceedingly bad. While making the foregoing checks, the best results were obtained by road-testing the vehicle, making ignition and carburetor adjustments simultaneously. Poor low-speed and idling settings are brought about by a peculiar and proved combination of circumstances. As an example, vehicle drivers "drifting" into stops fail to declutch promptly, engines stall repeatedly and are reported for stalling; mechanics, as a precautionary

measure, make rich adjustments. Further, during winter months, mechanics are prone to enrich idling adjustments to facilitate starting; but, although this is a very simple expedient, it is

extremely costly and annoying.

Investigation was undertaken to determine whether any direct relation existed between the mechanical condition of the engine and complaints of exhaust-fume conditions. Engines that had been in service for 25,000 miles since the last overhaul were checked, using an air-fuel-ratio meter to obtain correct carburetor adjustments. The following air-fuel ratios are typical of those secured after adjustment of the carburetor; initial adjustments being made in the garage and final carburetor and ignition adjustments being made on the road:

- (1) Idling on a 13.2:1 air-fuel ratio
- (2) For maximum motorcoach speed under load, a 13.6:1 air-fuel ratio

According to our investigation, probably the greatest single factor in combating gas fumes is to be found in maintaining correct carburetor adjustments.

Although present-day carburetion has been materially improved, further development as related to fuel economy and exhaust fumes is necessary.

Another factor responsible for gas fumes is the widely fluctuating intake-manifold vacuum in modern high-speed engines. At times of maximum intake-manifold depression, an excess of gasoline is drawn into the combustion chamber, where it is incompletely burned and results in excessive fumes. This condition occurs when drifting to a stop or in downhill operation. Automatic relief-valves that control intake-manifold conditions have been found to be helpful in eliminating trouble from this source.

Prediluting the exhaust, deodorizers and synthetic or concentrated perfumes in gasoline have given more or less indifferent results, since they are superficial remedies rather than cures.

Importance of Proper Driving

Much in the way of help can be gained by properly educating the vehicle driver in the manipulation of the throttle. Moderate acceleration and deceleration tend materially to decrease exhaust fumes. Frequent starting and stopping under heavy-traffic conditions emphasize the importance of this phase of operation.

Engine Maintenance

We have intentionally left poor engine-maintenance for the last item, believing, as we do, that few operators of up-to-date motorcoach and truck equipment consider anything but the best of care sufficient for all types of automotive equipment.

Body Ventilation

Aside from the question of fumes, good ventilation in a motorcoach is necessary to keep the CO₂ exhaled by the passengers within reasonable limits and to prevent the spread of disease.

In schools, theaters and public buildings, ventilation is often specified by limiting the CO₂ content of the air. Each occupant exhales approximately 0.7 cu. ft. of CO₂ per hr. Modern ventilation standards demand not more than 12 parts of CO₂ in 10,000 parts of air. To keep the CO₂ content within these limits, each occupant must be supplied with approximately 13 cu. ft. of outside air per min.

Applying this to a motorcoach and making allowances for normal leakage through window cracks, door openings and the like, the foregoing requirements can be expressed as sufficient ventilation to produce a complete air change in the vehicle each 5 min. This will assure each seated passenger at least 13 cu. ft. of air per min.

The ventilation secured with static-type ventilators is dependent upon the number of ventilators, outside-air conditions and the vehicle speed. Under some operating conditions, the foregoing results cannot be obtained with such ventilators. However, equipment is now available which provides positive ventilation that, under all conditions, meets the requirements already specified, and it is recommended that the manufacturers and operators take advantage of this equipment at an early date for the increased comfort and safety of their patrons.

Work of Highway Users Conference Gets under Way

DIRECTOR ROY F. BRITTON, of the Highway Users Conference, reports that assistant directors have been appointed and a headquarters staff organized in the City of Washington to push aggressively the work of carrying out the purposes of the organization. Information regarding existing and proposed legislation affecting the operation of highway vehicles is being gathered from all available sources, and a legislative reporting service is to be established. A meeting of the advisory committee was held in New York City on Oct. 7 and another is planned for early in November.

A State Highway Users Conference has been organized in Pennsylvania; similar organizations are proposed in New Jersey and Ohio and a field man has been trained for like work in Illinois.

The national organization will not assume the functions of any existing organization or individuals nor attempt to supplant or duplicate their efforts in opposing destructively drastic legislation or promoting uniform, reasonable and just regulations. Full cooperation from all interested organizations and individuals in setting up State conferences along the right lines is be-

sought. The Society is cooperating to the extent of supplying engineering information regarding motor-vehicles and the probable effect of various legal restrictions upon design and operation.

Federal Board Recommends Uniform Gasoline-Tax Laws

UNIFORM State gasoline-tax laws, with limitation of the tax funds to the benefit of motor-vehicles, were recommended by the Federal Oil Conservation Board in a report to the President which was released on Oct. 19. The board is comprised of Secretaries Roy D. Chapin, of the Department of Commerce; Patrick J. Hurley, of the War Department; Charles F. Adams, of the Navy and Ray L. Wilbur, of the Department of the Interior.

The board pointed out that existing high tax rates are resulting in diminishing returns; that a general scaling down of rates would be both equitable

and bring in more revenue; and that a uniform gasoline-tax law does not mean a uniform tax rate, as State conditions differ. Diversion of funds for other than the benefit of motor-vehicles is held to be at variance with the purpose of the tax.

The report states that

The principal requirements of a successful, workable, uniform gasoline-tax law are

- (1) The rate should not be unduly high
- (2) The incidence of the tax should be uniform, with no exemption for material actually used as motor fuel and with the source of the tax so fixed as to place all refiners and marketers on an equal basis in the sale of gasoline
- (3) The definition of material subject to the tax should be broad
- (4) Funds yielded by the tax should not be diverted to uses other than for the benefit of motor-vehicles
- (5) The law should require that money collected in payment of the tax shall be paid to the State in a reasonably short time

Production Engineering

(Concluded from p. 27)

ingenious mechanical designing that has made American industry. And if the machinery people are to have purchasing power so that they may exercise their function as consumers they must make some profit on their efforts. Enlightened selfishness would take this factor into consideration while negotiating an equipment purchase.

Consideration of Human Factor

One more factor in equipment policy that I want to mention is the human factor. Most of our manufacturers are no longer able to replace men with machines and give no thought to what will become of the men. They do not always know what to do about the men but they at least worry about them. One scheme that seems to have some merit was adopted recently by New York City needle-trade employers. New machines replaced men and made considerable savings. Part of these savings were put into a fund to tide the displaced men over until they could reestablish themselves as wage earners. This plan may not work in other places but it is indicative of a state of mind that holds hope for the future.

In the long run the new machine brings more employment at better wages and shorter hours, but during the transition it may cause suffering, and that is a condition which we must take steps to prevent.

Speaking of shorter hours, our new equipment policy must not overlook a very impressive change in the general attitude toward the length of the working day and the working week. Five years ago the 5-day week was a radical dream and employers looked askance at anyone who suggested it. Today they are talking unconcernedly of 6-hr. days and 5-day weeks, of 40-hr. weeks and even 30-hr. weeks. To do any good toward relieving unemployment, it will

not do for some manufacturers to shorten hours while others continue the longer working week.

Adjust Policy to New Conditions

That the average factory worker will work shorter hours and at a higher rate per hour seems inevitable. Two or more shifts will be the rule in many industries. Under these new conditions only up-to-date equipment will permit of profitable operation for the manufacturer. In planning his equipment policy he must be prepared for conditions wholly foreign to his old experience, and that policy should be adjusted to conditions as they change. The establishment of a policy is one of the essential elements of successful management and of profitable operation. A rigid equipment policy is fully as untenable as an unchangeable standard.

Council Approves New Members

APPLICATIONS of 33 new members of the Society were approved by the Council at its Oct. 4 meeting in Toronto. Considerable satisfaction was expressed in the record of 537 new applications received between Jan. 1 and Sept. 15, 1932.

A. Gelpke, Chairman, A. L. Beall and W. C. Keys were appointed as the committee in charge of the Annual Dinner, which will be held in New York City on Jan. 12, 1933.

The Council approved the appointment of the following additional members of the Lubricants Research Subcommittee:

A. P. Anderson	E. W. Hutton
M. R. Bower	W. W. Lowe
A. Ludlow Clayden	George E. Merkle
G. M. Cunningham	F. A. Nason
Howard Dingle	G. L. Neely

Indiana Leads!

Hoosier Section Forges Ahead with Best Record of New Membership

JUMPING over the Canadian and Philadelphia Sections, the Indiana Section has suddenly assumed the lead in the race for Section honors in the Get-Your-Man membership campaign with a score of 33.4 per cent of its quota elected and paid up. Undoubtedly the consternation which this has caused in Philadelphia and in other quarters will make it necessary to write a different headline when the next issue of THE JOURNAL goes to press.

The standing of the Sections and the individuals in the contest for the

various awards is given in the accompanying tabulations. These figures are based on the number of new members who had been elected and had paid their initiation fee dues prior to Oct. 18.

The Awards

As the time approaches, some two months hence, when the final determination of the awards can be made, the awards themselves assume special interest.

Awards will be made in two classes: (a) Individual General Awards and (b) Section Awards, both individual and group.

able prize to the approximate value of \$20

Second Award.—Each Section has been assigned a quota of new members, said quota being based upon the number of Section members and the average number of applications received over the last three years from the Section territory.

To the Section securing the highest percentage of its quota of new members—A general award, the nature of which is to be determined by the Council

The winning Section shall also be awarded a Section banner.

SECTION STANDING

(Expressed in Percentage of Quota)

1 Indiana	33.4
2 Philadelphia	31.7
3 Baltimore	29.9
4 Canadian	27.6
5 Southern California	25.0
6 Chicago	18.7
7 Metropolitan	17.3
8 Kansas City }	16.6
8 Northwest }	
9 Detroit	15.7
10 Syracuse	12.1
11 Pittsburgh }	11.6
11 Cleveland }	
12 Washington	10.0
13 St. Louis	9.7
14 Dayton	8.1
15 Buffalo	7.9
16 Northern California	6.0
17 Wichita	5.9
18 Milwaukee	4.7
19 New England	4.3
20 Oregon	0.0

Individual General Awards

- (1) To the member securing the largest total number of new members in the United States and abroad—Life membership in the Society
 - (2) To the member securing the second largest total number of new members in the United States and abroad—Three years' paid-up dues in the Society
 - (3) To the member securing the third largest total number of new members in the United States and abroad—Two years' paid-up dues in the Society
 - (4) To the member securing the fourth largest total number of new members in the United States and abroad—One year's paid-up dues in the Society
- To the next 10 highest—S.A.E. pins.

Section Awards

Individual.—To the member in each Section securing the largest number of new members in his territory—Suit-

INDIVIDUAL STANDING

(For Individual Awards)

First Place

John F. Hardecker

Tied for Second Place

H. M. Jacklin	L. R. Joslin
C. H. Jacobsen	L. M. Porter

Tied for Third Place

R. N. Du Bois	L. V. Newton
A. Gelpke	G. O. Pooley
F. K. Glynn	C. C. Stewart
R. N. Janeway	R. R. Teetor
C. C. Mathis	O. M. Thornton

Tied for Fourth Place

George B. Allen	C. G. Kreiger
A. F. Coleman	B. J. Lemon
R. H. Combs	Reese Lloyd
Malcom R. Cox	Charles I. MacNeil
J. G. Holmstrom	E. E. Tattersfield
W. C. Keys	Alex Taub
George W. Winter	

"Get into the Field!" Operators Advise Factory Men

(Continued from p. 19)

Economies of Oil Reclamation

Wednesday Luncheon Discussion also Covers Use of Employee-Owned Cars for Company Business

TWO interesting subjects were discussed by four speakers at the luncheon the second day of the meeting under the chairmanship of L. V. Newton, of the Byllesby Engineering & Management Corp., Chicago. The first topic was Economies of Oil Reclamation, on which the speakers were G. T. Hook, editor of the *Commercial Car Journal*, Philadelphia, and R. A. L. Bogan, of the Greyhound Corp., Chicago. The second topic was Use of Employee-Owned Cars in Business, which was presented by J. M. Orr, of the Equitable Auto Co., Pittsburgh, representing the National Electric Light Association, and H. Johnson-Tighe, of the Sun Oil Co., Ltd., Montreal, representing the Canadian Electrical Association.

Savings with Reclaimed Oil

Mr. Hook approached the preparation of his paper by asking and obtaining answers to three questions regarding the effect of reclaimed oil on the engine, saving in cost of oil by operators who use reclaiming apparatus and size of fleet or number of gallons of oil drainings in a given period required to show a profit on investment in the apparatus.

The reason for the first question was that, if reclaimed oil has a harmful effect on the engine, the saving in oil cost is of no consequence, as a 2-per-cent increase in maintenance cost will completely offset a 50-per-cent decrease in the oil item. Evidence that reclaimed oil is as good as new oil has been accumulated from unbiased sources and is substantiated by oil refiners themselves, the Bureau of Standards and chemists acting for fleet operators. Some statements are to the effect that the reclaimed oil is even better for the process it undergoes. As a result of this portion of his investigation, Mr. Hook concluded that "the effect of reclaimed oil on the engine is at least as good as, and not any worse than, that of the original oil."

Examples were cited of large fleets

using reclaimed oil with no effect on maintenance cost where the crankcase drainage period was unchanged and with very substantial reduction in engine overhaul where the drainage period was reduced.

From replies to the second question, the cost of reclaiming used oil worked out in the neighborhood of 12 cents per gal., according to Mr. Hook, when interest on investment and depreciation on the reclaiming outfit were added to the direct cost for labor, materials and power. However, reclamation costs, including all overhead and direct cost items, will vary from 10 to 18 cents per gal., depending upon the variable factors.

Great disparity developed regarding the size of fleet or gallons of drainings necessary to make reclamation show a profit on investment, because of the wide range in cost of the reclaiming outfits, differences in prices paid by operators for new oil and the fact that many fleet operators do not keep accurate records of crankcase drainings. The minimum recommendations for gallonage per month ranged from 31½ to 250.

Greyhound Lines Make Large Savings

Experience of the Greyhound Lines with oil reclamation was cited by Mr. Bogan, who concluded his remarks with the statement that

To throw away used oil obtainable from drainings in any substantial quantity is synonymous with killing the goose that laid the golden egg.

The Greyhound Lines find that oil can be reclaimed at an approximate cost of one-third to one-half the cost of new oil. As the Greyhound operating companies throughout the United States purchase more than 500,000 gal. of oil per year at an average cost of about 30 cents per gal., the loss would be terrific if the drained oil were not reclaimed. The total cost of reclaiming is approximately 14 cents per gal., including depreciation and repairs on the machines. From 25 to 35 per cent of the

original oil purchased is available for reclaiming, and 80 to 85 per cent of this is actually saved.

Mr. Bogan stated that the reclaimed oil is pure, often cleaner than the original oil, and in viscosity and other properties is as good as, if not better than, the original oil.

Employee-Owned Cars in Business

In a rather extended paper, Mr. Orr discussed the advantages and disadvantages of employee-owned cars versus company-owned cars and the unusual relationship between employee and employer in the former case. He listed seven basic principles that must be adhered to in any arrangement that is made for the use of an employee's car on company business to avoid misunderstanding and dissatisfaction.

The type of operation best suited to the service of employee-owned cars, Mr. Orr thinks, is one containing very few or no trucks, with low vehicle density at any point and with scattered sales or similar representation. As vehicle density increases, the advantages of employee over company-owned cars decrease and disappear. He believes that the subject is deserving of greater consideration than it is receiving and that transportation managers must give it proper weight and come to a firm decision as to whether it is economical or desirable in their operations. He holds that use of company-owned equipment is preferable in any operation if it is not more costly.

Rates of payment for use of employees' cars, form of agreement, insurance and expense accounting were some of the major items considered in some detail.

Employee's Viewpoint and Costs

Mr. Johnson-Tighe approached the subject from the viewpoint of the employee-owner and the cost of operating privately owned cars. Every such employee feels that he is discriminated against as compared with employees operating company-owned cars. Whether the employee profits by owning the car depends upon whether he has part-time work and covers only a few miles per day or uses it in full-time sales work and upon the allowance granted by the company

for use of his car. A tabulation of operating expense, including running and fixed costs, for a year, based on investments of \$1,250 and \$1,750, showed gross costs of 7.21 and 8.625 cents per mile respectively.

Employees are more careful of their own than of company cars, make some of their own minor repairs and are likely to use their cars for longer service periods, making for lower costs to the company.

In the MacDonald paper, he thinks that the engineers of the industry should study the paper carefully and compare it with the data previously printed, as maximum loads of 22,000 lb. per axle were recommended by the Bureau some years ago when solid tires were in general use. He disagreed with Mr. Schon's suggestion that an over-all width exceeding 96 in. should be recommended.

The danger of making continual demands for public assistance in the matter of advice on legislation was pointed out by Mr. Winchester, who feels that the automotive industry may find itself later in the present difficult financial position of the railroads, which, largely through Federal control, are now forced to ask for aid from the Reconstruction Finance Corp., to the funds of which we all have to contribute.

Roads Chief Proposes Limits

MacDonald Gives Uniform Code Proposals—Schon Fears $L +$ Formula Misused, Discusses Effects on Design

STATE restrictions on motor-vehicles and the effect that these have on design and operation was the subject considered at the Wednesday evening session, which was convened by G. W. Garner, Past-Chairman of the Canadian Section. M. C. Horine, International Motor Co., Long Island City, N. Y., presided as Chairman.

The first paper, prepared jointly by T. H. MacDonald, chief of the Bureau of Public Roads, and J. T. Thompson, professor of civil engineering at Johns Hopkins University, was presented by H. S. Fairbank, also of the Bureau. In it the recommendations of the American Association of State Highway Officials as to dimensions, weight and speed of heavy motor-vehicles were given and the reasons for them explained. This paper is published in this issue of the S.A.E. JOURNAL.

In the second paper, Pierre Schon, of the General Motors Truck Co., Pontiac, Mich., discussed in detail the present greatly diversified restrictions in the laws of the 48 States and the District of Columbia and the changes in design made necessary if trucks used in interstate operation are to render their most economical service. This paper also appears in this issue. Mr. Schon points out that the present legal restrictions are depriving the public of the benefits of the great advances made in recent years by motor-vehicle and highway engineering and sounds a vigorous warning of more drastic legislation to be introduced at next winter's sessions of the legislatures of 44 States.

Discussers Exhibit Concern

Exorbitant motor and gasoline taxation, mentioned at some length by Mr. Schon in his paper, was touched on also in oral discussion. The Bureau of Public Roads paper was commended in written discussion by T. C. Smith, of the American Tele-

phone & Telegraph Co., New York City, for the constructive, conservative and reasonable suggestions as to vehicle width, height, lengths, speeds and loads. J. F. Winchester, of the Standard Oil Co. of New Jersey, Newark, in written discussion read by Chairman Horine, said that the paper again demonstrates the willingness of the Bureau to advance and promulgate ideas that should benefit the Nation as a whole if men in the industry will hew away through the right channels for legislative action on uniform motor-vehicle laws.

Mr. Smith expressed the hope that Mr. MacDonald would soon favor the Society with information covering such items as motor-vehicle lighting requirements, permissible overhang of loads, brake requirements, length of drawbars and trailer-connection requirements. One detail that he would like to have considered as an addendum to the requirements in the MacDonald paper is the length of combined truck and trailer when used for hauling telephone poles that vary from 20 to 65 ft. in length. He suggested that, to the recommendations for a maximum length of 35 ft. for a single vehicle and 65 ft. for a combination of vehicles, a statement be added to the effect that

Exceptions are made for vehicles hauling poles, piling, pipe, girders and similar loads that cannot be dismantled for transportation.

Mr. Winchester, as a member of the committee of the Society that is studying engineering angles of the subject and cooperating with certain other national organizations in the matter of recommendations for a universal uniform vehicle code, expressed the hope that individual members of the committee would promote the proposals of the committee by taking an active interest in State organizations in their respective communities. Before accepting the low axle-loads suggested

Scaife and Horner Criticize Taxes

President Scaife discussed the taxation problem as it affects the farmer and called attention to drastic restrictions that have been put into effect in Pennsylvania, which places a heavy burden on the transportation man who brings milk in from the farms, thus indirectly imposing an unnecessarily severe burden upon the farmer. He also asserted that we should refer to the "parking brake," not the "hand brake"; and, in closing his remarks, called attention to the fact that taxes obtained from motor-vehicles, gasoline and other related items are being diverted to other than highway uses in such a way that they do not assist motor transportation.

F. C. Horner, of the General Motors Co., New York City, raised a strenuous objection to the proposal made in certain quarters to the effect that the person who operates a passenger-car should pay a nominal tax for his use of the highways and the commercial-vehicle operators should carry the rest of the highway costs. In answer to a question by Mr. Horner, Mr. Schon stated that a 12-ft. maximum height for commercial vehicles would seriously interfere with the movement of military equipment, notably certain equipment belonging to the Engineering Corps.

The $L +$ Formula Is "Poison"

Mr. Schon took occasion again to state that the so-called $L +$ formula is poison, because the various States can change the constants of the formula so as to make the regulations

derived therefrom non-uniform and chaotic. Referring to the value of 800 for the constant *C* in the formula and the values of 8000 and 9000 lb. for wheel loads, Mr. Fairbank asserted that the MacDonald recommendations present these as minimum values, which will mean that the loads permitted in States that adopt the recommendations will be at least as great as indicated by the above values; they may be greater according to the constants that are used in a given State.

Referring to the example presented by Mr. Schon, in which the *L*+ formula is applied to the pair of axles of a six-wheel vehicle, Mr. Fairbank stated that this case was a misapplication of the formula, which should be so applied as to have *L* refer to the distance between the extreme front and rear axles of the entire combination.

Mr. Fairbank indicated that a gross-load limitation is necessary for bridge protection. He explained that the recommendations by Mr. MacDonald took into consideration the general run of bridges but were not applied to protect those that are notably weak.

Regarding the suggestion made by Mr. Smith, Mr. Fairbank agreed that an exception should always be made in State laws with respect to the over-all length of non-divisible loads such as telephone poles.

Answering an inquiry by Mr. Fairbank, Mr. Schon stated that modern-vehicle design has definitely eliminated the element of side-sway and "snaking."

H. C. Kelting, Truck Association Executives of America, Louisville, Ky., said he believes that the Government departments which are striving toward the general adoption of a uniform set of motor-vehicle requirements could very well assure the wide adoption of their recommenda-

tions by refusing Federal aid for highway development in any State that does not adopt the recommendations. He referred to difficulties experienced in Kentucky in trying to license vehicles on the manufacturer's rating. Mr. Schon stated that this trouble has been eliminated in States where licensing is based upon

gross rate rather than upon the manufacturer's rating.

Mr. Whitback, speaking of height limitations, said that a 12-ft. height limit, as specified in the MacDonald recommendations, is decidedly inadequate for the movement of military equipment, notably for tanks carried on trucks and trailers.

Pressures Up in Engines, Down in Tires

Edgar Reviews High-Compression Advantages; Darrow Shows "Big Tire" Applications

F. K. GLYNN, American Telephone & Telegraph Co., New York City, presided over the session on Thursday morning, Oct. 6, at which the adaptation of automotive engines and fuels to each other and recent developments in pneumatic tires were outlined in two papers. The first of these, which was entitled Automotive Fuels and Engines, was presented by Dr. Graham Edgar, Ethyl Gasoline Corp., New York City. Burgess Darrow, Goodyear Tire & Rubber Co., Akron, Ohio, was the author of the other paper, on Pneumatic Tires—Old and New, which is printed elsewhere in this issue.

Adapting Engines and Fuels to Each Other

Valuable cooperative research by the automotive engineers and the oil refiners was said by Mr. Edgar to have resulted from an increasing realization that the efficiency of the internal-combustion engine depends in a large measure upon the nature of the fuel available for it. Important progress has been made in this research work and the foundation laid for further progress. The speaker then outlined the more important characteristics that a motor fuel should possess and indicated the

relationships existing between possible engine efficiency and fuel characteristics.

Most of the paper was devoted to a discussion of the tendency to detonate and the possibility of increasing the compression ratio, and therefore the efficiency of the engine, if this tendency is overcome or reduced. Brake mean effective pressures could be vastly in excess of the employed today, if detonation could be overcome, by increasing the compression, supercharging, or both.

The detonation tendency of a fuel was said to be entirely dependent upon the chemical nature of the fuel. One constituent—heptane—knocks worse than any gasoline, whereas another—iso-octane—knocks less than any gasoline; hence antiknock value is expressed in terms of percentage of octane in a blend of heptane and octane. This is called the "octane number." However, no fixed relationships exists between the octane number and the permissible compression ratio, as this depends upon the design and characteristics of the engine.

With no other change than an increase in compression ratio, said Mr. Edgar, the engineer can increase the engine power and decrease the exhaust-gas temperature, the heat lost to the cooling water and the fuel consumption. The increase in power adds a greater percentage to the reserve power for acceleration and hill climbing than it does to the power of the engine as a whole. The increase in ton-miles per gallon is greater than the increase in miles per gallon in the case of commercial vehicles. The increase in the power of tractors, motorcoaches and motor-trucks by the use of higher compression has been found, he said, to more than compensate for the use of high-antiknock fuels.

That the engineer has not reached



PIERRE SCHON



T. H. MACDONALD

the limit of engine performance that can be attained with a given fuel has been shown by recent laboratory experiments on the increase of brake mean effective pressure by abnormal cooling of the valves and pistons. The devices used in the tests were not practical for use on the road but the results indicate that the burden of further development must be borne in part by the automotive engineer.

Desirability of Greater Volatility

In a written discussion, M. C. Horine, International Motor Co., Long Island City, N. Y., asked if greater volatility would not permit the use of cooler and leaner mixtures and thus enable the compression ratio to be increased sufficiently and successfully to obtain worthwhile gains in the mean effective pressure. With present refining methods, antiknock agents may be a cheaper method of attaining the desired freedom from detonation than increasing the volatility but such a possibility should be considered since the future may hold possibilities for the more economical production of high-volatility gasoline which are now unknown.

Antiknock and detonation are not the only important fuel considerations, according to written discussion submitted by T. C. Smith, American Telephone & Telegraph Co., New York City, who pointed out that straight-run fuels had been improved to the point where well-designed comparatively high-compression engines could operate on them without undesirable detonation. Operators of present-day vehicles apparently are not greatly concerned about an occasional knock, especially if the gasoline is slightly cheaper. He also cited the case of a motor-truck operator who found that the use of a low-priced gasoline having a knock rating of approximately 55 had cured his drivers of the tendency toward rapid acceleration when starting. While this fuel had not been used for a sufficient length of time to secure definite data, the operator believed, said Mr. Smith, that this somewhat slower acceleration might result in a decreased maintenance cost.

Diesel and Gasoline-Engine Fuels

Answering a question by President Scaife, Dr. Edgar stated that, as far as he knew, no definite steps have been taken to treat Diesel-en-

gine fuels in a manner similar to the tetraethyl-lead treatment for gasoline-engine fuels. Diesel-engine fuel technicians, he said, are, as a matter of fact, working in the opposite direction to provide fuels that will ignite at the lowest possible compression pressures. Calling attention to the fact that over-rich mixtures are sometimes depended upon for valve cooling, President Scaife inquired if the tendency toward using lean mixtures might not be carried too far. Commenting upon this, Dr. Edgar said that the intensity of the knock decreases with the enrichment of the mixtures and consequently too lean a mixture will result in excessive detonation. Maximum-knock and maximum-economy points are very close together.

Referring to the fuel-performance curves of Diesel-engine fuels and ordinary gasolines, Austin M. Wolf, consulting engineer, New York City, expressed his belief that the tendency of the two curves would be to meet. He stressed the point that non-uniform cooling of the engine causes hot spots that constitute the weak link in the chain. Aircraft designers have shown the way to uniform temperatures, and automobile engineers should study aircraft practices with particular reference to the effect of manifolding and valve size on the actual compression ratio, volumetric efficiency and other important factors being taken into account. Dr. Edgar elaborated on Mr. Wolf's remarks and said that brake mean effective pressure is a much better indicator of thermal efficiency than the numerical compression ratio. As an illustration, he pointed out that a retarded spark and reduced valve size could easily counteract an increase in numerical compression ratio so that an engine of this type might well be able to have a high numerical compression ratio and burn any fuel satisfactorily, although with such a combination the power output might be lower.

Operators Do Not Appreciate High-Antiknock Fuels

A. L. Clayden, Sun Oil Co., Detroit, deplored the fact that fuels of high antiknock capacity have not been appreciated by operators of commercial vehicles. This situation is due to the designing engineers of commercial vehicles not having taken full advantage of the higher-compression engines wherein the antiknock fuels show to great advantage.

A. S. McArthur, Toronto Transportation Commission, said he believes that at present the operators are somewhat behind the field of design, but this condition will be corrected with the return of better general conditions.

The Tire-Overloading Evil

Sidney M. Cadwell, United States Rubber Co., Detroit, in a written discussion of Mr. Darrow's paper, contributed some very pertinent data on the economic loss resulting from overloading tires and stated that the range of overloads on motorcoach and motor-truck tires is from 11 to 101 per cent. To support this, he cited the results of a motor-truck transportation survey recently completed by the Department of Commerce which showed that 25 per cent of all motor-trucks were operated at overloads of between 100 and 125 per cent. In further substantiation, he presented a table of the percentage of tire adjustments against sales as reported by the Rubber Manufacturers' Association for the year 1931, which showed that, while for all sizes of passenger balloon tires the percentage was only 1.94, in the sizes commonly used by motorcoaches and motor-trucks the percentages varied from 12.08 to 21.28.

Negative axle camber in some instances imposed an additional overload of 10 per cent on the inside tire of a dual wheel, and, if road crown was taken into consideration, this extra load was doubled. Better and more sympathetic understanding between vehicle, transportation and tire engineers is the crying need at present, according to Mr. Cadwell. Tire engineers and chemists can be depended upon to improve the product constantly, but the best motor-truck tires that the industry knows how to produce are not doing a good average job, and the fault does not lie with the tire.

Mr. Smith commented favorably upon the intelligent work that has been done by the tire manufacturers, which has resulted in the production of tires that are equal in reliability to the vehicle on which they are used.

Pneumatic Tires in Agriculture

The development of rail-car tires by the Firestone Tire & Rubber Co. was described by J. W. Shields, who specifically mentioned a record performance on a run between Jacksonville and Miami, Fla. High unit



GRAHAM EDGAR



BURGESS DARROW

loading, which means short life, is one of the decided limitations placed on the rail-car tire, but he believes that this type will be satisfactory for light rail-cars seating not more than 18 or 20 passengers. Pneumatic tires that have proved satisfactory for one agricultural application might be decidedly the reverse for another. Savings of 25 per cent in the gasoline consumption and 18 per cent in time have been effected by the application of pneumatic tires in agriculture, he said, citing tests which showed that equipping a tractor with suitable pneumatic tires increased the drawbar pull 50 per cent as compared with the conventional steel wheel. The introduction of pneumatic tires was, in his opinion,

the greatest innovation in agricultural work since the tractor and no farmer can now afford to operate on steel wheels.

Mr. Horine advocated a return to "steel inches" in giving tire dimensions and explained that great discrepancies exist in actual and nominal dimensions due to the use of what he termed "rubber inches."

Mr. Darrow, in closing the discussion, agreed with Mr. Horine that the time had come to stop changing dimensions. Commenting upon Mr. Cadwell's discussion, he said that at present motorcoach tires in general are not seriously overloaded but that truck tires do suffer from this condition. Large tires, he thinks, are likely to replace air-wheels on tractors.

Six-Wheelers and Fleet Operation

Technicalities of These Trucks Stated and Fleet Operation as a Going Business Considered

BEFORE the 1932 Transportation Meeting was brought to a close on Oct. 6, Austin M. Wolf, consulting engineer, and Edward E. LaSchum, of the Railway Express Agency, both of New York City, recognized their opportunity, stepped briskly up to the plate and batted out two papers of the sort that warm the cockles of transportation men's hearts. As one might say, they were both home-run papers and each one scored.

M. L. Brown, Jr., of the Seiberling Rubber Co., Toronto, convened the afternoon session and A. G. Herreshoff, of the Chrysler Corp., Detroit, was chairman.

Six-Wheel Trucks¹

Mr. Wolf called attention to a typographical error in his paper as

¹See S.A.E. JOURNAL, October, 1932, p. 387.

printed. The first line of the first column on p. 400 should read: "The six-wheeler is *not perfect*"; instead of reading "not perfected." Another correction also should be made, where "torque-rods" should be substituted for "torque-arms" on p. 391, second column, line 11.

Open Minds Rule Truck Industry

M. C. Horine, of the International Motor Co., Long Island City, N. Y., stated that tremendous progress is evident after one reads the literature of the truck industry of only a few years ago. This is proof of the foregoing heading. Further, that nowhere is this better illustrated than in the abrupt reversal of sentiment concerning the interaxle differential, or power divider. He remarked the able covering of the present knowledge of torque phenomena on four-wheel drives, by Mr. Wolf, as well as

the rapidly crystallizing opinion with respect to interaxle differentials. He suggested that there is a very close relationship between these two subjects in that, after everything has been done to minimize load transference from one driving axle to another, due to torque reactions, the interaxle differential offers a still further compensation to equalize axle loading.

Experience Cited on Two Subjects

T. C. Smith, of the American Telephone & Telegraph Co., New York City, stated that in experimenting with different types of free-axle attachment to the rear of conventional four-wheel trucks and also with free-axle equipment on Christie crawler outfits without the tracks, he has found that when the vehicle leaves the hard-surfaced road danger of being stuck always is present because of the action of the free axle in relieving part of the load from the driving axle. This free-axle support for a part of the load at the rear causes the driving wheels to lose traction and then to dig into soft ground, sand or mud so quickly that the vehicle is not usable under such conditions. The action is similar in soft snow.

As to front-wheel drive on six-wheel vehicles, Mr. Smith wrote that if these units are used on private rights-of-way front-wheel drive should be used, as much for assistance in steering as for assistance in moving the vehicle. In his experimenting with six-wheel outfits without front-wheel drive where the ground was rather soft, the tendency was for the front wheels to push sideways through the soft ground while the vehicle went straight ahead and did not respond to the steering angle of the front wheels. In his opinion a field for the six-wheel vehicles undoubtedly exists, but he believes it will be limited to heavy-duty units.

B. B. Bachman, of the Autocar Co., Ardmore, Pa., stated that the sentiment regarding interaxle differentials and power dividers may not be as fully crystallized as one might expect. He is skeptical as to whether these units really function in practice according to the theory. He believes that the speed of operation may be a real factor in determining the functioning of the units.

Other Opinions Presented

L. R. Buckendale, Timken-Detroit Axle Co., Detroit, said that the question of torque control is little under-



E. E. LASCHUM



A. M. WOLF

stood and must be studied under kinematic conditions in the field. W. R. Gordon, of the Truck Equipment Co., Buffalo, remarked that the trailer type of axle will bear considerable investigation. He mentioned the fact that 33 States allow a greater load on three axles than on two, but he noted that the tendency is to reduce gross weights; therefore he believes that the adaptability of the axle to each particular field should be studied. J. W. Shields, Firestone Tire & Rubber Co., Akron, Ohio, said that he was glad to note a trend toward the interaxle differential, which he believes will be helpful from the viewpoint of tire service. Major Jackson, of Leyland Motors, Ltd., Leyland, England, reported that results on fleets of six-wheel vehicles developed by his company in cooperation with the British War Office have demonstrated that the six-wheel vehicle is worthy of wide consideration, especially for the hardest type of service.

Saying that Mr. Wolf had rendered a service in pointing out the difficulties of designing a suitable differential for interaxle service, James W. Cottrell, of the *Commercial Car Journal*, Philadelphia, said that experience of operators will settle the question of such differentials. To be truly effective, the interaxle differential must be almost instantaneous in action and at the same time strong enough to sustain the torque compounded through multi-speed transmissions.

Major Points of Mr. Wolf's Reply

Mr. Wolf enlarged upon the subject of universal-joints as printed in his paper* and acknowledged that Mr. Horine's comments regarding the close relationship between torque reaction and the interaxle differential

constitute an important consideration with a four-wheel-drive bogie unit. He remarked that a study of Steeds' analysis will bear this out. He concurred in Mr. Smith's view that front wheels should drive in very soft ground so as to give the vehicle dirigibility when the front wheels are at an angle; otherwise, he said, the wheels merely become points of support, and their deflection does not react in steering the vehicle. This trait already has occurred with four-wheelers, he added. In conclusion, he reiterated that each type of six-wheeler should be applied to the field for which it is best suited. He stated that the four-wheeler is here to stay, and that no one should attempt to force a six-wheeler upon a prospect when the four-wheeler will do the work. Each individual problem should be analyzed carefully so that misapplication is impossible, he said; otherwise, confidence in the industry will be shaken.

Elements of Fleet Operation That Need Improvement

Dealing with fleet operation as a business that is too little understood and appreciated, Mr. LaSchum discussed and emphasized in his comprehensive paper those elements that his experience indicates are in need of improvement. He pointed out that there are more than 1,500,000 truck drivers and more than 400,000 garage and repair-shop employees in the Country. His comments on fleet operation were made largely from the personalized point of view indicated by the saying, "Business is but the lengthened shadow of a man."

The duties and qualifications of the fleet manager were set forth, the selection and training of his personnel were discussed and his relations with his superior officers were considered. Because the job of fleet operation is not very interesting to a

board of directors, who are very busy men seldom equipped with a background of motor-vehicle experience, the fleet manager must dramatize it so as to show concrete figures that represent substantial savings. But as financial statements and operating statements are mysterious and confusing to many men, they should be simplified and thoroughly digested so that they can be explained confidently to one's superiors.

Mr. LaSchum said that, because truck operation is a relatively new department in many businesses, decentralized control of fleets has made efficient operation difficult. The large corporations are slowly changing to centralized control and placing better qualified and more responsible men in charge of their fleet operations. Some of the advantages of centralized control were pointed out and the difficulty of convincing the organization of its desirability and of securing the cooperation of the personnel were indicated by the speaker.

The twofold object of maintenance was defined as (a) to keep existing equipment serviceable with minimum expense and (b) to build a record for guidance in the questions of major repairs and replacement of vehicles. A sample chart record of repair jobs giving at a glance the complete repair history of every truck in a group was shown.

As a means for determining when to retire a truck, Mr. LaSchum presented tables and charts of repair and overhaul costs, plus first cost, for eight years and of the downward trend of maintenance costs for gasoline and electric trucks in his company's New York City department for the last 3½ years. In this period the average maintenance cost on gasoline trucks was reduced by 29.20 per cent and that of electric trucks by 47.11 per cent. Running repairs, he showed, remain fairly constant after the third year for gasoline trucks and do not increase in the case of the electric after six years. But as the cost for gasoline trucks remains fairly constant after the fifth year, the small saving made by keeping them in service would be more than offset by the difference in trade-in value and the superiority of new trucks. The electric truck, however, need not be retired until it becomes obsolete.

Mr. LaSchum gave 10 questions similar to those in a questionnaire
(Concluded on p. 34)

*See S.A.E. JOURNAL, October, 1932, p. 387.

News of the Sections

HENRY M. CRANE was the chief speaker at the Oct. 12 meeting of the Philadelphia Section, at which General Manager John A. C. Warner gave a thumb-nail sketch of the important happenings at the Society's Production Meeting in Buffalo and Transportation Meeting in Toronto. Mr. Crane's topic was, The Car of the Future. The members' dinner was attended by 71 and the technical session by 103 members and their guests. The speakers were introduced by Chairman J. P. Stewart and Norman G. Shidle.

Two Ways to Make Progress

Mr. Crane's remarks pertained largely to past, present and future conditions surrounding automobile developments and the relationship between these conditions and the way in which designers and manufacturers interpret the requirements of the public in terms of automotive transportation. He said he felt that our economists, who have operated on theories and statistics, have missed their mark rather sadly during the depression. They have come to be included in the same boat with efficiency men; the latter have passed on and it is hoped that they have some sort of reward.

While he is interested in the future, Mr. Crane said he is not opposed to taking his directions from the past. He dramatized this point by mentioning the two ways of handling a boat; one exemplified by the gondolier and the lobsterman, who stand at the rear of the boat looking ahead; the other by the more common type of oarsman, who turns his back on the direction of progress and gets his direction from things that are behind, occasionally looking ahead to check his course. Real progress can be achieved by either method, and the speaker recommended that we utilize past events to the greatest possible advantage, at the same time keeping an eye on future requirements.

Mr. Crane said he was very appreciative of the great strides that have been taken in automobile design and construction in the last few years and called attention to the fact that now a superior type of automobile can be bought at one-eighth the sales price of a much less attractive car 10 years ago. Public demand forces us to advance, but it is impossible to get ahead with business as we should by sitting at a desk and thinking things over.

Cars must now have versatility to a degree that was unheard of years ago. To illustrate this point, Mr. Crane mentioned his recent experiences in Wyoming, where his car was called upon to operate under difficult temperature conditions, not only at sustained high speed on level ground but also under severe conditions of mountain climbing. "Out in Wyoming," he said, "nobody wants a

peanut automobile. We haven't begun to get where we are going. Newer cars are doing a better job. Public demand has engineers with their tongues hanging out. People in remote places are now motor-car conscious and are interested in the features of automobile construction."

Mr. Crane expressed his belief that top speeds of automobiles will not go much higher than they are today, at least for some time to come, but that *sustained high speeds* will go higher; in fact, the new year will bring cars in the low-price field that are capable of sustained speed of better than 75 m.p.h. These speeds, he believes, will be very necessary and demanded by motorists in the West.

High speed, however, must be accomplished with safety, and, according to Mr. Crane, the best cars are none too good in this respect today, while the worst cars have no business on the road at high speeds on account of their poor roadability. Steering-gears, he thinks, have not kept pace with the possibilities of the engine for higher speed. With high-speed drive we should have a steering-gear ratio of 14 or 15 to 1, whereas present cars require a ratio of 18 or 19 to 1 in traffic and parking. These requirements are conflicting and necessitate a compromise which is not altogether satisfactory for the two extremes of operation. Not only steering but engine performance must accommodate itself to low-speed operation in the cities with good acceleration and parking ability, but the selfsame vehicle must do well on hills and have sufficiently high speed for sustained operation on level roads.

Roadability to Be Improved

High-speed roadability on rough roads makes attractive the possibility of independently sprung wheels, which Mr. Crane believes will be of interest during the next two years.

Mr. Crane stated that we now have engines rotating at 4000 to 4500 r.p.m. to give the present high vehicle speeds. At the outset these high-speed engines produced unsatisfactory engine sensation and something had to be done to improve this. The 16-cylinder car brought about a new standard of smoothness and started thought on the possibilities of obtaining smoothness through various methods. The muffled inlet as well as exhaust were adopted and various means have been devised to counteract free forces that tend to make engines vibrate.

A prediction was made that next year will bring a much more satisfactory ride and automatically controlled shock-absorbers of high efficiency in

regulating the ride.

People in the high places of the industry wish to eliminate the gearshift entirely, according to the speaker, who said that this can be accomplished but a de-

cided question exists as to whether it can be done commercially at present. The public demand will decide this point as well as many others. The mechanism must be capable of intelligent thinking if it is to shift automatically in a proper way.

The Chimera of Excessive Lightness

"Small foreign cars are good for other people to use," asserted Mr. Crane, remarking further that it is painful to scale a car down in size and then find it still about as heavy as it was in the larger size if good practices of strength and rigidity are adhered to. He believes a decided limit exists below which a designer cannot go in striving toward a light car without running into extremely expensive manufacturing methods and eventually coming out with a car that has no advantage other than being small. There is a fallacy in many arguments that are put forth in favor of extremely light car construction. The owner does not pay very much for weight, and considerable weight is necessary to obtain the necessary strength and rigidity.

Present-day bodies are very safe, in Mr. Crane's opinion, but up to this year the ventilation has been "as good as it was in the Model-T Ford." He believes that we shall soon see something good in the way of ventilation but that air-conditioned cars will not come for some time on account of the cost, weight and power required.

"I hope to goodness that we shall soon stop making our cars lower," said Mr. Crane. "There is scarcely room enough now to get the machinery between the floorboards and the ground, and some of our present low cars are lacking in comfort features."

Regarding tires, Mr. Crane said that the cost per mile today is one-tenth of what it was in wartime. We shall see changes in tire design and construction and these changes will change the whole car. He believes that we shall depart from carriage traditions but must move with caution to keep away from extremely radical features of body design. "There is no reason why the bodies should not extend from bumper to bumper," in his opinion.

We can move ahead from the present in car design without being radical; "streamlining per se is not good looking," said Mr. Crane. To obtain real streamlining we must have an extremely long car, and "a stubby front end does not agree with the public's idea of something going somewhere"; the arrow, for example, gives the opposite effect. Rear mounting of engines is being studied but it has certain difficulties, particularly as relates to con-

trol; a long car is likely to be difficult to handle.

Two or three years probably will be needed to get the new type of design in fenders and bodies as well as in other car features to suit the new tires. Wood wheels are out. Disc wheels or stamped wheels may come back, to go with the new tire and hubs. Mr. Crane does not believe in giving the public a tire that needs to be held to very narrow limits of pressure to make a satisfactory ride and to have sufficient life in the tire, and that there is a definite danger in handing to the public things that are too technical. He believes that we shall see 6 and 7-in. tires on small cars but that we are not yet ready for the 9 or 10-in. tire and very low pressures.

Section Activity Auspiciously Resumed

Preceding Mr. Crane on the program, General Manager Warner commented favorably upon the auspicious beginning of the Section year, not only at Philadelphia but by other Sections of the Society, whose meetings have been well attended and brought to light technical material of great value. He called attention to the fact that the work of the Sections is one of the most important phases of S.A.E. activity and that the success of the Sections, as exemplified by activities to date, is entirely consistent with the progress being made in Society work generally.

Every individual and every organization is today confronted with obstacles to be overcome and problems to be solved, said Mr. Warner. S.A.E. members and their Sections and Society are no exception to this rule, "but the stage is all set to go ahead with the same spirit that has always kept the S.A.E. in the lead as an organization that positively will not stand still."

Daytonans See Factory Process

FOR their October meeting on the 11th, 65 members of the Dayton Section visited the Kurs-Kasch Co.'s insulation-molding plant in Dayton to observe the process in operation. Mr. Kurs, of the company, gave a talk following the inspection, in which he described the details of the process.

Detroit Initiates Unique Three-Activity Meeting

TO start its new meetings season, the Detroit Section initiated its new plan of holding simultaneous sessions of its several activities with a meeting on Oct. 10 at the Book-Cadillac Hotel. Three activities—the Body, Aeronautic and Production—discussed topics of special interest to each group at separate meetings following a general members' dinner, at which an opening address was made by Chairman E. V. Rippingille.

Aircraft Engines for Marine Work

Pleading for Army and Navy support for large, high-performance aircraft-engine development, to bring back to this Country some of the speed records now held abroad, Marvin J.

Steele, marine engineer of the Packard Motor Car Co., addressed the meeting of the Aeronautic Activity. His subject was High-Performance Aircraft Engines of the World and Their Marine Adaptation.

Before approximately 200 members and guests, Mr. Steele reviewed the existing records and described briefly the present aircraft engines of 600 hp. or more. In concluding, a comparison was made of the Rolls-Royce Schnieder Cup engines used in Miss England II with the Packard V-2500 engines of Gar Wood's Miss America X.

Through the courtesy of Commodore Wood, talking pictures were shown of the building, launching and testing of the present world's record holder. It was the first public showing of this film, which was followed by sound pictures of the Harmsworth races and the speed trials in which the Miss America X brought the record back to this Country.

Unable to be present because of an out-of-town engagement, Gar Wood was represented at the speakers' table by Orlin Johnson, who has handled the engines for Commodore Wood in all of his races and who is often referred to by Mr. Wood as his "better half."

Interest in Precision Boring

In the Production Activity meeting considerable interest was shown in the development of diamond and carbide tools for handling both ferrous and non-ferrous metals, as covered in a paper on Precision Boring presented by William F. Wise, of the Ex-Cell-O Aircraft & Tool Corp. An especially strong demand exists for tools and machinery for boring iron and steel, with which metals the greatest obstacles have been met in experiments and installations made by various companies. The Ex-Cell-O company very frankly admits the many problems in handling steel, according to Mr. Wise, but believes that progress is being made and that to date a few successful applications in operation have been made. The Hudson Motor Car Co. reported that it went through a period of experimentation in boring pistons and that the final move was to reduce the silicon 25 points in the alloy piston, which produced a more uniform grain structure and eliminated cold shuts that previously broke down the tools. Mr. Wise stated that the irregular structure and heat-treatment results found in boring many steel parts are important problems to be solved. The Continental Motors Corp. is of the opinion that adapting this type of finishing to cylinder bores would be an important improvement in machine-shop practice, as it should produce a very accurate bore.

That the machine-tool trade is alive to the possibilities with and refinements in products resulting from the use of boring machines was evidenced by interest of its representatives in the paper. A number expressed the view that some of the machine-tool companies would have models on the market during the coming year. Car-designing engineers expressed a keen interest in the paper and discussion because of their belief that closer limits and repetitive accuracy in producing power-unit

parts are essential to the program to improve car performance.

At the Body Activity session Herbert G. Winters, consulting engineer of the Briggs Mfg. Co., presented a paper on Aerodynamics Applied to Present-Type Bodies.

Airwheels and Airships Hold Attention of Northwest Section

LOW-PRESSURE tires and lighter-than-air ships were discussed in two headline addresses at the Oct. 7 meeting of the Northwest Section, held at the Bergonian Hotel in Seattle.

L. C. Bennett, special representative of the Goodyear Tire & Rubber Co. and the Commercial Tire Co., ably handled the subject of airwheel or super-balloon tires. E. L. Walter, also with the Goodyear company, exhibited a motion picture of the giant airdock at Akron, Ohio, and the building of the airship Akron's sister ship, the Macon.

C. C. Finn, Section Chairman, presided over the gathering of 34 members. Don Gilmore was appointed Chairman of the Reception Committee for the next meeting and also Chairman of the Employment Committee, a new activity.

Mr. Walter brought out in his talk that the mooring mast at Tacoma, Wash., is the fifth in size of the 12 in this Country. He predicted passenger-airship service for the future that will reduce the time between California and Hawaii to 36 hr., to the Philippine Islands to 6 days and between New York City and Paris to 2½ days.

Great interest was manifested in Mr. Bennett's talk on airwheels, which was based on experiences of and information gathered by the Goodyear company. He admitted that much is still to be learned and some "bugs" to be eliminated. However, his conclusion was that the new type "is here to stay" and that it is making good and can be adapted to any type of car, with certain required changes. Each car presents its own specific problem, but a remedy exists for every problem, he declared.

Troubles such as shimmy, tramp and hard steering are aggravated by the low-pressure tire, he admitted, but all can be offset. Alignment, correct inflation, balance, tighter snubber adjustment, correct steering set-up and replacement of worn parts are usually essential to get correct results and satisfactory performance.

Mr. Bennett mentioned details of changes required for certain cars, based on knowledge the tire men had gained in application of airwheels to cars in the Northwest. He said that 300 sets of airwheels are now in use in Seattle and that, when a car is put in proper condition, uniformly good results are obtained.

The new super-balloon tires provide four times the bearing surface on the road, making it hard to skid the wheels.

"The car owner cannot expect the tire dealer to overhaul his worn-out car to make airwheels work," asserted Mr. Bennett. "The new tire is not a cure-all, but it certainly has pleased our customers in every way. When the tires are rightly installed, the car will handle like a breeze. I predict that the

day will come when we shall see springs on automobiles entirely eliminated. We have used a truck equipped with low-pressure tires and no springs on a certain job here and the results have been excellent. However, airwheels will have to go through stages similar to those of balloon tires, but this progress will be faster."

Indiana Section's Hagerstown Plant Visit, Outing and Dinner Meeting

MEETINGS of the Indiana, Cleveland and Dayton Sections at the Hagerstown, Ind., plant of the Perfect Circle Co., are becoming an established custom. The first fall meeting of the Indiana Section was held there on Oct. 13, about 50 S.A.E. members from Indianapolis, Dayton, Purdue University and West Lafayette and other Indiana and Ohio points making the trip for the plant and laboratory inspection trip from 1:30 to 5 p. m. Dinner at the Hagerstown Country Club, where some played golf in the afternoon, was held at 6:30 p. m., with 76 members present.

At the technical session after the dinner, about 125 members heard informal talks by Roy W. Paton, experimental engineer, and Harry M. Bramberry, engineer, of the Perfect Circle Co., on the company's new piston expanders and new standards of cylinder-wall finish. The speakers gave the results of research and experiment on engine performance as related to pistons and piston-rings, illustrating their explanations with lantern slides.

The rest of the time in the evening was devoted to questions and answers on the brief talks and concerning details observed during the plant inspection.

Announcement was made that the November meeting of the Indiana Section will be held in the Indianapolis Athletic Club on Nov. 11, with President Scaife as the chief speaker. His subject will be Highway Transportation and Taxes. Sam C. Hadden, secretary-treasurer of the Indiana Motor Traffic Association, is scheduled to speak on The Legislative Battle on Highway Transportation in Indiana, and General Manager John A. C. Warner is to deliver a Headquarters Message.

Met Section's First Aeronautic Division Meeting and Inspection Trip

THE first meeting of the Aeronautic Division of the Metropolitan Section for the 1932-1933 season was held at the Hotel New Yorker, Oct. 6. Preceded by the regular dinner with an attendance of 76, the meeting came to order promptly at 7:30 p. m. with W. S. Peper in the chair.

The guest of honor and speaker of the evening was James Ray, of the Autogiro Co. of America, who was greeted with an attendance of 174 Section members and invited guests associated with the aeronautic industry.

Mr. Ray approached his subject from the basic fundamentals of the aircraft industry in relation to the prospective owner of an airplane. He first related

his experience in flying from Willow Grove, Pa., to New York City that afternoon and pointed out the few physical reflexes he was called upon to use in flying to the metropolis in his Autogiro as compared with the physical strain had he driven his automobile. He then took his audience into his confidence and enumerated the many "unmentionables" in aviation that are freely discussed among flying men but not in the presence of the general public. Mr. Ray next discussed the adaptability of a person to things earthly and the natural transition from the time he navigates on roller skates until he drives an automobile. Said Mr. Ray, speaking of a youth:

He cannot see the presence of air and therefore, when he decides to learn to fly, he must bridge in a few lessons the lack of air consciousness from childhood to young manhood. Mistakes during this period have sometimes been fatal. Therefore we must put into his hands an airplane having characteristics such as will make his training period and flying thereafter safe.

The audience was much impressed with Mr. Ray's talk and discussion was spontaneous. Prepared discussion presented by C. H. Biddlecombe, Alexander Klemin, Benjamin F. Castle and A. Burke Wilford was enthusiastically received.

J. Rosen, a young student of New York University, read a short paper on the result of wind-tunnel tests on Autogiro vanes.

An inspection trip to the Newark Airport on Oct. 8, the Saturday afternoon following the meeting, was attended by more than 125 members and guests. Lieutenant Aldworth, manager of the field, acted as host and the Eastern Air Transport took 36 of the group for a flight over New York City. Mr. Ray was again present, this time with a Pitcairn Autogiro, and he put on a beautiful flying exhibition to back up his remarks of Thursday evening.

The next Aeronautic Division meeting of the Section will be held Jan. 26, at which time Air Transportation will get its share of attention.

Syracusans Told of Car Attributes Desired by Motorists

IN cooperation with the Syracuse Technology Club, the Syracuse Section of the Society held, on Oct. 10 at the Onondaga Hotel, the first meeting since its affiliation with the club. The meeting was attended by 167 persons, many of whom participated in the discussion following the presentation of the address of the evening.

A hearty welcome was given to members of the Society by the President and Secretary of the Technology Club, after which Chairman Moulton, of the Syracuse Section, introduced General Manager John A. C. Warner, who delivered the address.

Great Opportunity for Intelligence

The burden of Mr. Warner's remarks applied to the desires of the motoring public insofar as they relate to features of motor-car construction and design. Mr. Warner stated that so-called public demand is a misunderstood term and

that the public in general is inarticulate until a given car is purchased and a certain reaction results therefrom. He said he felt that the intelligent manufacturer has a great opportunity, as yet not fully realized, to anticipate with considerable certainty the requirements of the public and to supply vehicles that will meet with public favor.

Among the various attributes with which the car must be endowed are safety, comfort, reliability, economy, good appearance and the like. The alert manufacturer is able, through related experience in the automotive and other industries, to adopt acceptable practices in the design of his car as these practices relate to the essential attributes that the car should possess.

After discussing the subject of consumer research, Mr. Warner reviewed the possibilities of design features that are now the subject of discussion, including super-balloon tires, independently sprung wheels, ventilating and air-conditioning of bodies, streamline construction and rear engine-mounting. He also referred to the ever-present discussion of light-weight construction.

In the discussion, suggestions were offered as to what the motoring public desires in the way of automotive transportation, one of the requirements frequently emphasized being simplicity of control.

Chicagoans Have a Tire Session

SUPER-BALLOON tires and the development of pneumatic tires were the subjects presented at the meeting of the Chicago Section which was held on Oct. 11 in the Sherman Hotel. Eighty-five members and their guests attended the meeting, and as a substitute for the customary members' dinner, a buffet supper was served after the technical session.

The paper on the super-balloon tire was given by B. J. Lemon, of the United States Rubber Co., and covered much the same ground as his Semi-Annual Meeting paper, which was published in the October issue of the S.A.E. JOURNAL.

The paper on tire development was given by Burgess Darrow, of the Good-year Tire & Rubber Co., and was the same one that he presented at the Transportation Meeting of the Society in Toronto in October, which is published in this issue.

Truck Legislation and Refrigeration Considered at Baltimore

UNDER the title Obstacles to Motor-Truck Development, a paper by George H. Scragg, manager of the national sales division of the Brockway Motor Co., dealing with some of the effects of restrictive legislation was read at the Oct. 20 meeting of the Baltimore Section by Past-Chairman A. Bruce Boehm in the absence of the author on account of the illness of Mrs. Scragg.

A short talk on the taxation now imposed upon truck operators and additional taxation measures contemplated for enactment by State legislatures next winter was given by John E.

Raine, general manager of the Automobile Trade Association.

Two representatives of the Aluminum Co. of America spoke briefly on the correct application of insulating material and related factors in truck refrigeration. They outlined the various methods employed by large fleet operators and shippers of perishable products.

Forty-four members of the Section and their guests were present at the meeting, which was held at the Emerson Hotel following a members' dinner. In lieu of the usual orchestral music, Joseph Bavett, of the Yellow Cab Co., of Baltimore, sang several songs to piano accompaniment by John M. Klein, of the American Oil Co., of Baltimore.

Mr. Scragg's paper was discussed orally by J. P. McComas, of the White Transportation Co.; Jay Hugin, of the American Oil Co.; Robert C. Hall, of the United Railways & Electric Co. of Baltimore, and William H. Beck, of Sherwood Bros., Inc.

Southern California Aeronautic Meeting

AERONAUTICS engaged the attention of 118 members of the Southern California Section and their lady guests at a dinner meeting held at the Sunset Canyon Country Club near Los Angeles on Oct. 1. Two speakers presented papers. F. W. Herman, aeronautic engineer of the Douglas Aircraft Co., spoke on Factors Governing Design of an Army Observation Airplane, and A. A. Barrie, a pilot of the Western Air Express, gave the pilot's viewpoint on the Federal Airways System.

Asked by W. E. Powelson if any instruments are in use that will show the pilot how far he is from the ground, Mr. Barrie answered in the negative.

Cleveland Discusses Advanced Automobile Design

BEFORE an attendance of 120 members and guests of the Cleveland Section on Oct. 10 at the Cleveland Club, William B. Stout elucidated his ideas of What Modern Automobiles Could Be and thereby opened the way for animated discussion by many members on various phases of automobile design and its relation to railroad-car, ship and aircraft design.

The technical session was preceded by a dinner participated in by 50 members and presided over by President Scaife, of the Society. Dining was to the accompaniment of piano music, followed by popular songs by the members before the speaker of the evening was announced.

Modern Electricity Demonstrated at Milwaukee

THE Milwaukee Section was treated to an experimental demonstration of modern electricity by President Oscar Werwath, of the Milwaukee School of Engineering, at its Oct. 5 meeting, held at the Milwaukee Athletic Club. The demonstration was preceded by a members' dinner, attended by 36, and an entertainment. The attendance at the technical session was 150.

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In his demonstration and explanation, Mr. Werwath covered the decomposition of water, thermoelectric phenomena, electromagnetic waves, radio, television and a 500,000-volt Tesla coil in action.

St. Louisans See National Air Races

MOTION pictures of the National Air Races at Cleveland in August were shown and a report on the events was given by F. E. Zimmerman, of the aircraft department of the Shell Petroleum Corp., at the first meeting of the St. Louis Section this season. The meeting was held on Sept. 27 at the Coronado Hotel and was attended by 35 members and guests, who were much interested in and entertained by Mr. Zimmerman's first-hand account of the races.

Wichita Section Elects Officers

THE first meeting of the season of the Wichita Section was held on Oct. 13 at the Green Parrot Inn for the purpose of electing officers for the 1932-1933 season. A members' dinner was held before the business session. The new officers elected were as follows:

Chairman—Mac Short, chief engineer, Stearman Aircraft Co.

Vice-Chairman—Andrew S. Swenson, owner, Swenson Motor Co.

Secretary—T. A. Wells, chief engineer, Beech Aircraft Co.

Treasurer—A. N. Petroff, director, School of Aeronautics, University of Wichita.

Horning Analyzes Psychology of Research at "Met" Student Meeting

BEFORE a gathering of about 225 members of the Metropolitan Section and engineering students of the metropolitan area, assembled for the Student meeting of the Section on Oct. 20 at the Hotel New Yorker, Harry L. Horning, of the Waukesha Motor Co. and Past-President of the Society, spoke on the general subject of Research in his usual vivid and entertaining way.

The address was opened with the statement that the three ways in which people arrive at conclusions are by (a) the deductive method, (b) religious or mystical thought and (c) the inductive or research method.

Today most men decide nearly all questions on an emotional basis, being guided by opinions, not facts. Except for a few scientific minds, by far the most common habit of mind has been to accept an authority for some dogma, illusion or vision.

What Research Is

Mr. Horning pointed out that research is a method of inquiry and a way of thinking that has steadily grown from the 17th to the 20th centuries. The strides it has made have resulted in discoveries and inventions at such a rate that they can hardly be assimilated by our social, economic and political systems. Research is the quest of the pertinent, he said.

Several peculiar things happen during every research project; namely,

- (1) A general hesitation in getting under way
- (2) The tendency to go off on a tangent or become interested in a by-product of the research
- (3) The tendency to delay the finish, which results in loss of the greater value of research
- (4) Psychological collapse when the investigation is done, with great delay in following through to the application of an idea
- (5) Skepticism of the practical man toward the results of a research undertaking
- (6) The difficulty of getting the market and the world in general to adopt the results of research

Professors Take Part in Discussion

The paper was discussed by Dr. Harvey N. Davis, president of Stevens Institute of Technology; Prof. L. C. Lichty, of Yale University; Sir Ernst Petters, president of Petters, Ltd.; Frank C. Mock, of the Eclipse Aviation Corp.; Dean J. W. Barker, of Columbia University; John A. C. Warner, General Manager of the Society, and a number of others. The discussion was unusually animated, the agreement of the educators with the main points made in the paper being particularly noteworthy.

The attendance of nearly 100 students and their interest throughout the program augur well for future meetings of this type.

Fisher Discusses Engine Materials and Design at Pittsburgh

SEVENTY-NINE enjoyed dinner at the initial meeting of the Pittsburgh Section at the Fort Pitt Hotel on Oct. 11 and later arrivals boosted the meeting attendance to 149, who participated in the discussion on Factors Controlling Gasoline-Engine Design and Development, as presented by James B. Fisher, chief engineer of the Waukesha Motor Co. Entertainment accompanied the dinner.

Charles R. Noll, of the Gulf Refining Co., Chairman of the Section, briefly described some of the attractive features scheduled for future meetings and announced that B. H. Eaton, Past-Chairman, had accepted the Chairmanship of the Member Employment Service.

President A. J. Scaife brought greetings from the Cleveland Section and told of progress made through the Society in establishing standards of measurement that have made for progress, such as the recently developed C.F.R. engine, which serves as a "yardstick" for the detonation factor, one of the most important qualities in fuel.

A. J. Underwood, director of Section activities, spoke briefly on the continued growth of the Sections.

Improved Engine Materials and Efficiency

Mr. Fisher, in his address, told how cast iron "grows" when exposed to temperatures above 600 deg. Fahr., how accumulated growth may cause distortion of cylinder bores and engine alignment and how it may be prevented by skillful engineering design or the use

(Concluded on p. 36)

Section Officers for 1932-1933

FOLLOWING is the list of officers elected at the close of last season by the 22 Sections of the Society to serve until the end of the Section administrative year on May 31, 1933. The new officers and their committees have been active since their election and appointment in making plans for the administration of the affairs of their respective Sections and for meetings to be held during the autumn, winter and spring months.

BALTIMORE

Chairman—John White, branch manager, Mack International Motor Truck Corp., Baltimore

Vice-Chairman—Carlton A. Guenther, general manager, vice-president, Jacobs Transfer Co., Baltimore

Secretary—Espy W. H. Williams, statistician, Automotive Trades Alliance, Baltimore

Treasurer—Laurance F. Magness, president, Hercules Power Gasoline Co., Baltimore

BUFFALO

Chairman—Maurice A. Thorne, chief experimental engineer, Pierce-Arrow Motor Car Co., Buffalo

Vice-Chairman—F. A. Smith, lubricating engineer, Standard Oil Co. of New York, Buffalo

Secretary-Treasurer—L. R. Jones, assistant chassis engineer, Pierce-Arrow Motor Car Co., Buffalo

CANADIAN

Chairman—Alex N. Bentley, manager, Exide Batteries of Canada, Ltd., Toronto

Vice-Chairman—John L. Stewart, general manager, Canadian Automobile Chamber of Commerce, Toronto

Secretary—Warren B. Hastings, editor, manager, *Canadian Motorist*, Toronto

Treasurer—Marcus L. Brown, Jr., factory manager, Sieberling Rubber Co. of Canada, Ltd., Toronto

CHICAGO

Chairman—Leonard V. Newton, automotive engineer, Byllesby Engineering & Management Corp., Chicago

Vice-Chairman—Harold Nutt, director of engineering, Borg & Beck Co., Chicago

Secretary—Robert E. Wilkin, sales engineer, Standard Oil Co. (Indiana), Chicago

Treasurer—Harry F. Bryan, assistant chief engineer, International Harvester Co., Chicago

CLEVELAND

Chairman—Thomas S. Kemble, chief engineer, Pennington Engineering Co., Lakewood, Ohio

Vice-Chairman—Walter S. Howard, chief inspector, White Motor Co., Cleveland

Secretary—William G. Piwonka, engineer, Cleveland Railway Co., Cleveland

Treasurer—Thornton R. Stenberg, brake engineer, Firestone Tire & Rubber Co., Akron, Ohio

DAYTON

Chairman—Ford L. Prescott, senior mechanical engineer, Powerplant Branch, Materiel Division, Air Corps, Wright Field, Dayton, Ohio

Vice-Chairman—E. C. Du Val, chief, production drafting, Materiel Division, Air Corps, Wright Field, Dayton, Ohio

Secretary—Frank G. Born, engineer, Delco Products Corp., Dayton, Ohio

Treasurer—A. N. Wilcox, president, Dayton Wire Wheel Co., Dayton, Ohio

DETROIT

Chairman—E. V. Rippingille, accessory group, executive staff, General Motors Corp., Detroit

Vice-Chairman for Passenger Cars—George B. Allen, chief engineer, Dodge Bros. Corp., Detroit

Vice-Chairman for Bodies—John W. Votycka, chief engineer, LeBaron-Detroit Co., Detroit

Vice-Chairman for Aeronautics—Ralph N. DuBois, chief experimental engineer, Continental Aircraft Engine Co., Grosse Pointe Farms, Mich.

Vice-Chairman for Student Activities—Harry T. Woolson, chief engineer, Chrysler Corp., Detroit

Secretary—V. P. Rumely, factory manager, Hudson Motor Car Co., Detroit

Treasurer—F. W. Marschner, western sales representative, New Departure Mfg. Co., Detroit

INDIANA

Chairman—Lee Oldfield, consulting engineer, Merz Engineering Co., Indianapolis

Vice-Chairman—H. M. Jacklin, associate professor, automotive engineering, Purdue University, West Lafayette, Indiana

Second Vice-Chairman—Charles C. Merz, manager, Merz Engineering Co., Indianapolis

Secretary—Harlow Hyde, Indianapolis

Treasurer—Charles A. Trask, engineer, Rockwood Mfg. Co., Indianapolis

KANSAS CITY

Chairman—Ralph R. Matthews, vice-president in charge of sales, Battenfield Grease & Oil Corp., Kansas City, Mo.

Vice-Chairman—Roy B. Mason, superintendent of motor equipment, Kansas City Gas Co., Kansas City, Mo.

Secretary—A. E. Gresham, chief aeronautic engineer, Standard Steel Works, Kansas City, Mo.

Treasurer—R. F. Hardin, general shop foreman, City Ice Co., Kansas City, Mo.

METROPOLITAN

Chairman—F. H. Dutcher, instructor, mechanical engineering, Columbia University, New York City

Vice-Chairman—Alfred F. Coleman, manager, motor-vehicle department, Standard Oil Co., Inc., New York City

Vice-Chairman for Aeronautics—W. S. Peper, account executive, Stewart-Davis Advertising Agency, New York City

Vice-Chairman for Marine Engineering—William E. John, manager, New York office, Sterling Engine Co., New York City

Secretary—Carl F. Scott, 25 Martling Avenue, Pleasantville, N. Y.

Treasurer—C. Herbert Baxley, mechanical engineer, refined-oil department, Vacuum Oil Co., Inc., Radburn, Fair Lawn, N. J.

MILWAUKEE

Chairman—Prescott C. Ritchie, advertising manager, Waukesha Motor Co., Waukesha, Wis.

Vice-Chairman—Paul W. Eells, assistant to president, Le Roi Co., West Allis, Wis.

Secretary—Wesley B. Pusey, sales engineer, S.K.F. Industries, Milwaukee

Treasurer—C. E. Frudden, chief engineer, tractors, Allis-Chalmers Mfg. Co., Milwaukee

NEW ENGLAND

Chairman—Dean A. Fales, associate professor, automotive engineering, Massachusetts Institute of Technology, Cambridge, Mass.

Vice-Chairman—A. W. Devine, assistant to registrar of motor-vehicles, Commonwealth of Massachusetts, Malden, Mass.

Secretary—A. E. Postal, service manager, United Motors Service, Inc., Boston

Treasurer—Albert Lodge, president and treasurer, Mohawk Chevrolet Co., Greenfield, Mass.

NORTHERN CALIFORNIA

Chairman—A. B. Dmonoske, executive head, department of mechanical engineering, Stanford University, Stanford University, Calif.

Vice-Chairman—Samuel L. Boukard, 48 Grattan St., San Francisco

Vice-Chairman for Aeronautics—Joseph F. Long, service shop superintendent, Curtiss-Wright Flying Service, San Mateo, Calif.

Vice-Chairman for East Bay—John M. Evans, manager of sales engineering and development, Associated Oil Co., San Francisco

Secretary—W. S. Crowell, claims adjuster, Independence Indemnity Co., San Francisco

Treasurer—Carl J. Vogt, assistant professor of mechanical engineering, University of California, Berkeley, Calif.

NORTHWEST

Chairman—Charles C. Finn, Northwest manager, John Finn Metal Works, Seattle

Vice-Chairman—Sherman W. Bushnell, engineering instructor, Washington Technological Institute, Seattle

Secretary—James H. Frink, assistant to manager, Washington Iron Works, Seattle

Treasurer—Alfred W. Oberg, superintendent of service, A. F. Blangy Motor Co., Seattle

OREGON

Chairman — H. W. Roberts, secretary, Roberts Motor Co., Portland

Vice-Chairman—Robert W. Mann, Isaacson Iron Works, Portland

Secretary — Allen T. Welch, maintenance engineer, Davidson Baking Co., Portland

Treasurer—J. Verne Savage, superintendent, Municipal Shops, City of Portland, Portland

PHILADELPHIA

Chairman—J. P. Stewart, head, automobile division, research and development department, Vacuum Oil Co., Inc., Paulsboro, N. J.

Vice-Chairman — O. M. Thornton, branch manager, Titeflex Metal Hose Co., Philadelphia

Secretary—J. B. Franks, Jr., sales manager, The White Co., Philadelphia

Treasurer—John C. Genlesse, research engineer, Atlantic Refining Co., Philadelphia

PITTSBURGH

Chairman—C. R. Noll, automotive lubrication engineer, Gulf Refining Co., Pittsburgh

Vice-Chairman—Murray Fahnestock, technical editor, *Ford Dealer & Service Field*, Pittsburgh

Secretary—Charles F. Kells, traffic manager, motorcoach division, West Penn Electric Co., Pittsburgh

Treasurer—Robert N. Austen, sales manager, Iron City Spring Co., Inc., Pittsburgh

SOUTHERN CALIFORNIA

Chairman—Charles F. Lienesch, special representative, Union Oil Co. of California, Los Angeles

Vice-Chairman for Automotive Engineering—Charles H. Jacobsen, service manager, Moreland Motor Truck Co., Los Angeles

Vice-Chairman for Aeronautics—William B. Birren, western representative, Wright Aeronautical Corp., Los Angeles

Secretary—W. E. Powelson, master mechanic, Los Angeles County, Los Angeles

Treasurer—J. Jerome Canavan, partner, Canavan & Kunkel, Los Angeles

ST. LOUIS

Chairman—A. O. Payne, president and general manager, Payne Products, East St. Louis, Ill.

Vice-Chairman — Joseph Coniff, general superintendent, People's Motorbus Co. of St. Louis, St. Louis

Secretary—Charles A. Marien, chief engineer, Ramsey Accessories Mfg. Corp., St. Louis

Treasurer—Robert M. Pease, manager, St. Louis factory, Axelson Aircraft Engine Co., University City, Mo.

SYRACUSE

Chairman—L. W. Moulton, product engineer, Manufacturers' Consulting Engineers, Syracuse

Vice-Chairman—Carl T. Doman, research engineer, H. H. Franklin Mfg. Co., Syracuse

Secretary—Richard N. Wright, assistant manager, Hubert J. Wright, Inc., Syracuse

Treasurer—Melville R. Potter, service manager, J. F. O'Connor Sales Co., Inc., Syracuse

WASHINGTON

Chairman—William P. MacCracken, Jr., partner, MacCracken & Lee, City of Washington

Vice-Chairman—Clarence S. Bruce, assistant mechanical engineer, Bureau of Standards, City of Washington

Secretary—J. C. McCalmont, associate aeronautic engineer, Bureau of Aeronautics, Navy Department, City of Washington

Treasurer—Edward S. Pardoe, superintendent of bus operation, Capital Traction Co., City of Washington

WICHITA

Chairman—Mac Short, vice-president and chief engineer, Stearman Aircraft Co., Wichita, Kan.

Vice-Chairman—Andrew S. Swenson, owner, Swenson Motor Co., Wichita, Kan.

Secretary—T. A. Wells, chief engineer, Beech Aircraft Co., Wichita, Kan.

Treasurer—Prof. Alexander N. Petroff, director, school of aeronautics, University of Wichita, Wichita, Kan.

"Get into the Field!" Operators Advise Factory Men

(Concluded from p. 32D)

issued by the American Railway Agency to its various offices throughout the Country for gathering information regarding suitability of the equipment and garages, methods of conducting service work and its cost and allied matters. He then discussed truck salesmanship and the kind of salesmen who are most useful to both the truck manufacturer and the fleet manager, the necessity for the design engineer to spend more time in the field with operators, the utility of trade associations in crystallizing motor-vehicle standards and the importance of winning public goodwill by maintaining vehicles in safe condition and operating them courteously on the road.

Important Prepared Discussions Read

Prepared discussions of Mr. LaSchum's paper were submitted by J. M. Orr, Equitable Auto Co., Pittsburgh; R. E. Plimpton, Cleveland; E. J. Arbour, Joseph Arbour & Son, New Britain, Conn., and J. F. Win-

chester, Standard Oil Co. of New Jersey, Newark. In addition, F. K. Glynn, American Telephone & Telegraph Co., New York City, said that centralized control can very well be maintained on an advisory status in many operations, thus allowing a given section manager to adapt his practices to the requirements of his particular locality, with which point of view Mr. LaSchum agreed.

Mr. Orr acknowledged motor-vehicle operation as a business of growing importance, but stated that it is but a means to an end in most organizations and is subordinated to the principal object of supplying some other commodity or service to the public. His other comments related to the many advantages accruing to a national fleet owner who uses "unified control"; to high maintenance standards which result in the fewest vehicle failures and interference with work problems; to lowest possible mechanical accident hazards, greater user satisfaction, best possible appearance and lowest cost

per mile; to Mr. LaSchum's method of determining the retirement point for a given vehicle and to agreement with Mr. LaSchum that the most welcome caller is the qualified sales engineer and that the operator should be sold transportation and not merely trucks.

Mr. Plimpton raised several points about statements made in the paper and analyzed them. These had to do largely with new undertakings recently inaugurated by the Railway Express Agency.

Mr. Arbour stated that he has given the question of interstate motor-truck regulation considerable study and enlarged upon this subject.

In conclusion, A. S. McArthur remarked that the Canadian Section members had enjoyed the visit of the members from the United States, and he thanked them for their neighborly spirit; whereupon Chairman Herreshoff responded with high appreciation for the hospitality that had been shown by the Canadian members.

Personal Notes of the Members

Sloan Heads National Committees

Alfred P. Sloan, Jr., is now devoting part of his time and effort to civic service as chairman of the Committee for the Consideration of Inter-Governmental Debts and as chairman of the Share-the-Work Movement in the Second Federal Reserve District embracing New York State, northern New Jersey and the southern part of Connecticut.

Early in October Mr. Sloan announced the names of 10 men prominent in industry as chairman of as many regional committees in the Second Federal Reserve District to urge the distribution of available work among a larger number of workers. Offices of the committee have been established by Mr. Sloan in the General Motors Building in New York City and a staff of voluntary executives lent by various business companies is working in the movement.

Mr. Sloan has risen rapidly to an outstanding position in the industrial world since becoming vice-president of the General Motors Corp. in 1920, and especially following his election to the office of president of the corporation in 1923. Prior to forming that connection he had had an interesting industrial career. Born at New Haven, Conn., in 1875, and graduated from the Massachusetts Institute of Technology in 1895 with the degree of bachelor of science, he entered the service of the Hyatt Roller Bearing Co., of Harrison, N. J., as a draftsman, his father having invested in that enterprise, which at that time was a very small concern.

When elected to Member grade in the Society in 1910, Mr. Sloan had been in control of the Hyatt company since 1897. Subsequently, the General Motors interests acquired the bearing business and, having noted Mr. Sloan's ability, made him vice-president of the General Motors Corp. in 1920, and three years later elected him to the presidency.

Davison Nominated for Lieutenant Governor

The Hon. F. Trubee Davison, Assistant Secretary of War for Aeronautics, was nominated for the office of Lieutenant Governor of the State of New York on the Republican ticket in October. Prior to his appointment to his present Federal office, Mr. Davison had served for several years in the New York State Legislature and also as head of the National Crime Commission, which was organized to investigate legal criminal procedure.

He was graduated from Yale University in 1918 with the degree of bachelor of arts and from Columbia University Law School in 1922 with the degree of bachelor of law. During the early part of the World War he initiated and organized the first Naval Aviation Unit at Yale University, which subsequently resulted in the formation of a series

of Naval Aviation Training Schools on the Atlantic Coast.

Mr. Davison was elected to Associate Member grade in the Society in May, 1931.

Rumely Leaves Hudson Company

Vincent P. Rumely, Vice-Chairman of the Society's Production Activity Committee, has resigned his position as factory manager of the Hudson Motor Car Co. of Detroit, after an association of 16 years with the company. He went from the Buick Motor Co. in 1916 to the Hudson company, for which he was successively in charge of gear manufacturing, time study, car assembly, body paint and trim, general stores and finally factory manager. His plans for the future have not been announced.

Heraclio Alfaro, formerly special representative of the Autogiro Co. of America and more recently vice-president and chief engineer of the F. W. Steere Co., of Pontiac, Mich., is now acting in the capacity of consultant at the Guggenheim School of Aeronautics, Massachusetts Institute of Technology, Cambridge, Mass.

Herbert D. Allee, having relinquished his former position as production manager of the Studebaker Corp. of Canada, Ltd., of Walkerville, Can., is now engaged in automotive and industrial consulting and sales engineering work in Detroit.

J. R. Allen, who was an aircraft designing engineer in the aircraft engineering division of the Ford Motor Co., in Dearborn, Mich., recently removed to Los Angeles, where he has gone into business for himself.

Alexander P. Bartusch is now engaged in die and tool designing for the Harrison Radiator Co., of Lockport, N. Y. He was formerly designing mechanical engineer for the Miller Machine & Mold Works, of Columbus, Ohio.

Paul K. Beemer, a former student at Leland Stanford, Jr., University, is now working as a junior engineer for the Chrysler Corp., at the Highland Park, Mich., plant on a two-year program of various research problems.

Charles S. Dahlquist has been appointed executive engineer on rubber-tire rail-car development with the Edward G. Budd Mfg. Co., of Philadelphia.

Frank S. Davis has given up his position of chief engineer of the Austin Mfg. Co., of Harvey, Ill. His plans for the future are indefinite.

Herbert L. Dickey, engineer in the manufacturers' service division of the Vacuum Oil Co., of New York City, has been transferred from Oakland, Calif., to the Detroit office of the company and retains the same position.

John E. Dube, who was assistant experimental engineer with the A. C. Spark Plug Co., in Flint, Mich., is now serving the Moto Meter Gauge & Equipment Corp., at La Crosse, Wis., in the capacity of experimental engineer.

Henry J. Edling has returned to the Fisher Body Corp. division of the General Motors Corp. in Detroit, where he is engaged in the capacity of body-die designing engineer and checker. He had held a similar position with the corporation prior to this year, when he became president of the Peninsular Engineering Co., of Detroit, and later president of the Industrial Engineering Co., of the same city.

O. M. Fahey recently sold his partnership interest in the firm of Gill & Fahey, of Spokane, Wash., and opened a shop of his own in the same city for sales and maintenance of electrical equipment for automobiles, motor-trucks and tractors.

Harold A. Fletcher recently formed a connection with the Caterpillar Tractor Co., of Peoria, Ill., as service engineer. He was formerly with the Marmon Motor Car Co., of Indianapolis, as supervisor of the service repair department.

Alfred A. Gassner is now chief engineer of the Zap Development Corp., of Baltimore, a subsidiary of North American Aviation. Prior to this appointment he was an independent consulting aeronautic engineer in New York City.

William C. Gould was recently appointed assistant general manager of the United Airports of Connecticut, at East Hartford, Conn. He was previously sales engineer for the Pratt & Whitney Aircraft Co., of Hartford.

E. B. Hand, who has been manager of the Cleveland office of the Fafnir Bearing Co., of New Britain, Conn., since 1917, has severed his connection with that office and opened a sales office at the same address. He is acting as manufacturers' sales representative in northern Ohio for the Fafnir Bearing Co., the New Process Gear Co., of Syracuse, and the York Corrugating Co., of York, Pa.

Edward W. Hart, formerly engineer in the aircraft department of the Ford Motor Co., at Dearborn, Mich., is now located at Pelham, N. Y., and has not announced his plans for the future.

Walter M. Hartung was this autumn appointed dean of aviation at Beckley College, in Harrisburg, Pa. His former position was that of aeronautic engineer with Granville Bros. Aircraft, Inc., of Springfield, Mass.

George H. Hibbard, formerly service-school instructor for General Motors Products of Canada, Ltd., at Oshawa, Ont., Canada, is now teacher of motor mechanics at the Oshawa Collegiate and Vocational Institute.

A. D. T. Libby, electrical engineer and patent attorney, who has been located for more than 20 years at the plant of the Splitdorf Electrical Co., in Newark, N. J., has opened offices of his own in the Federal Trust Building, Newark, for the private practice of his profession.

Robert P. F. Liddell has resigned his
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News of the Sections

(Concluded from p. 32H)

of improved materials. He described the improved steels now available to automotive engineers and how molybdenum was discovered and adapted to automotive use. He said that cast-iron crankshafts may possibly become standard in some cars and trucks within the next few years. Tests of such shafts have shown remarkable results as to resistance to both breakage and wear. The use of a new material, such as cast iron, for crankshafts has made possible, he said, the use of new and perhaps better materials for bearings.

B. O., as noticed by motorists who follow trucks and motorcoaches having large bodies, was explained by Mr. Fisher as emphasized by the suction behind the bodies tending to accumulate the engine fumes.

Thermal efficiency of gasoline and Diesel engines was mentioned and Dr. W. A. Gruse, of the Mellon Institute of Industrial Research, spoke on the economics of the relative cost of gasoline and Diesel-engine fuels as being largely governed by supply and demand. Gasoline once sold, he said, for less than kerosene, when the demand for it was less.

The influence of temperature on bearing failures was strikingly explained by Mr. Fisher, who stated that a bearing which could carry 22,000 lb. at moderate temperatures might suffer "softening of the molecules" and begin to break down at 4000 lb. when the temperature reached 400 deg. Fahr. This shows the importance of keeping the oil cool when driving at high speeds under heavy loads. The way in which an oil-pump may be an important factor in heating the oil was described, and the need of oil lines of adequate size to reduce back pressure on the pump was explained.

Discussing the relationship between cylinder size, compression ratio and number of cylinders, the speaker explained that small cylinders require and can carry a higher compression than large ones because they have more combustion-chamber area in relation to volume and so carry off the heat more rapidly.

Prominent discussers included President Scaife; Charles F. Kells, of the West Penn Electric Co.; Joe Harvey, of the Pittsburgh Motor Coach Co.; John M. Orr, of the Equitable Auto Co.; B. H. Eaton, of the Bell Telephone Co. of Pennsylvania and Arthur Tiel and Dr. Gruse, of the Mellon Institute of Industrial Research.

Washington Section Told about Patents, Aeronautic and Other

ABRAMHAM LINCOLN said that he regarded three things of prominent importance in the development of the human race. These were the discovery of America, the development of the printing press and the establishment of the patent system.

This was one of the comments made by the Hon. Thomas E. Robertson, Commissioner of Patents, in an address on Automotive Patents before an audience of about 50 at the Washington Section meeting on Oct. 20. Dr. George

W. Lewis, director of research of the National Advisory Committee for Aeronautics, discussed Aeronautic Patents and the Work of the Patents and Design Board, which examines all the aeronautic patents submitted to the Government.

Dinner was served at the Racquet Club to the speakers and a group of S.A.E. members, including Dr. H. C. Dickinson, nominee for President of the Society; A. J. Underwood, of the headquarters staff; William P. MacCracken, Jr., Chairman of the Washington Section; H. K. Cummings, of the Bureau of Standards, and Clarence S. Bruce, Vice-Chairman of the Washington Section and Past-Chairman. Approximately 50 attended the meeting immediately following the dinner.

Commissioner Gives Patent Office Facts

Mr. Robertson, introduced by Mr. MacCracken, said that our patent system was established in 1836 and had been copied by a number of countries. In the new system an effort is made to determine if an applicant for a patent really has made an invention and is entitled to a patent. This gives to the patents granted what is known as a "presumption of validity"; that is, a patent is regarded as valid until it is proved otherwise.

Pioneer inventors are often ahead of their time, said the Commissioner, who referred to Dunlop's patent on the pneumatic tire in 1848, when no one believed that a tube blown up with air would carry any considerable weight. The value of inventions often is not fully realized until circumstances force recognition; for example, an Austrian patented a war tank in 1912 and this patent was on file in the German archives, but it was not until late in the World War that the English built a small fleet of tanks, the sight of which in action soon convinced all the countries of their great value in warfare.

Since 1929 the Patent Office has had an average decrease of 12 per cent in applications filed, though certain arts have had an increase. The automotive art in all its branches makes up 18 per cent of all applications filed, and 100 out of 590 examiners work on some branch of the automotive art.

The biggest year of the Patent Office was in 1930, in which 91,000 applications were filed. The present rate is 73,000 per year.

Developments in one field often are remodeled for another field, for instance, the automobile lighting system was transformed into farm-lighting plants, thus bringing convenient lighting to thousands of farms.

Patents and Design Board's Work

Dr. Lewis reviewed briefly the development of the art of flying and then gave a résumé of the various types of devices submitted to the Patents and Design Board. The board consists of three men, the Assistant Secretaries of War, of the Navy and of Commerce, who pass upon all aeronautic patents submitted to the Government and fix the value of those in which the Government becomes interested. This value

shall in no case exceed \$75,000 for any one patent or design.

Prior to 1800, most of man's efforts to fly were directed to flapping-wing structures, said Dr. Lewis. Vertically rising or helicopter types have received considerable attention. These were experimented with by Edison and at present about \$160,000 has been spent on the Curtiss-Bleeker helicopter. In 1876 Renault patented an airplane that had many of the features of the present types and some that are still being developed, such as the retractable landing-gear and the controllable-pitch propeller.

In 1908 the United States bought the first airplane purchased by any government. The contract called for a speed of 40 m.p.h. and offered a bonus for extra speed. Glenn Curtiss developed the seaplane and received a basic patent for it.

In the résumé of the various devices submitted to the Government, slides were shown and the general faults or fallacies of the ideas were pointed out.

Airfoil Shapes Not Patented

Dr. Lewis said that, to his knowledge, no patents have ever been granted on airfoil shapes. Sharpening the nose or leading edge reduces the lift without other appreciable gains. Airfoils hold their characteristics up to 600 m.p.h., after which the drag increases rapidly and the lift drops, so a sharper edge may give better results. Auxiliary airfoils, such as the slotted leading edge, increase the lifting power and maintain the lift beyond the normal burble point. This gives quicker take-offs and slower landings. Holes in the upper surface of the wing reduce the boundary layer and show a great increase in lift.

Designs for many rotor-type airplanes have been submitted. A rotor placed in the leading edge increases the lift considerably but must be driven by the engine power, which involves danger in case of engine failure.

The geometric form and relation of the engine and fuselage to the wings has received much attention by inventors, said Dr. Lewis. Multiple wings increase the weight more than the aerodynamic gain. Tandem wings have the disadvantage of down-wash on the rear wings, lowering the efficiency. A triangular arrangement of wings has recently been used. A circular wing has a high stalling angle but also a high drag. The stalling characteristics are somewhat similar to those of the Autogiro. A low aspect-ratio is structurally good but aerodynamically very poor. A tunnel type of airplane, with the engine and propeller in the fuselage, is now being built by the Italian Government.

Ice formation on wings has received much attention. Devices to remove or prevent the formation of ice include an inflatable rubber covering on the leading edge, heat piped from the exhaust, steam from boilers, electric wiring, giant wipers, layers of paper to be torn off and greasy coatings. The rubber covering has been used in a few cases but, remarked Dr. Lewis, the need for such devices has not seemed to warrant their use.

Applicants Qualified

BENNETT, MERRILL (J) assistant in automotive engineering department, Purdue University, Lafayette, Ind.; (mail) 9060 Pleasant Avenue, Chicago.

CARPENTIER, MELBOURNE L. (M) chassis design engineer, Chrysler Corp., Highland Park, Mich.

COLLENDER, GUSTAVE A. (M) engineer, sales manager, Six Wheels, Inc., Los Angeles; (mail) 815 East 84th Street.

DECKER, ARTHUR R. (A) chief motor inspector, Texas Co., Norfolk, Va.; (mail) 501 East Ocean View Avenue.

DUNNELL, JACOB (M) naval architect, Crowninshield Shipbuilding Co., Fall River, Mass.; (mail) 86 Myrtle Street, Boston.

FERNISLER, ROBERT PALMER, JR. (S M) draftsman, engineering department, Naval Aircraft Factory, Philadelphia.

FREYERMUTH, GEORGE H. (M) research engineer, Standard Oil Development Co., P. O. Box 485, Elizabeth, N. J.

HOARE, WILLIAM P. (M) superintendent of repairs, Boeing Air Transport, Inc., Cheyenne, Wyo.

HOLSTEN, FRANK E. (M) vice-president, Barnsdall Refineries, Inc., Tulsa, Okla.; (mail) P. O. Box 2009.

HUGHES, JAMES R. (M) chief body engineer, Studebaker Corp., South Bend, Ind.; (mail) 1501 East Wayne Street.

HURTUK, S. H. (M) head, aeronautics and automobile mechanics, Board of Educa-

The following applicants have qualified for admission to the Society between Sept. 10 and Oct. 10, 1932. The various grades of membership are indicated by (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate; (S M) Service Member; (F M) Foreign Member.

tion, Cleveland; (mail) Collinwood High School.

JOHNSON, CAPT. RICHARD W., U. S. A. (S M) Holabird Quartermaster Depot, Baltimore.

KAMP, JOHN CLIFFORD (J) sales engineer, Holley Carburetor Co., Detroit; (mail) 130 Odette Street, Flint, Mich.

KELLER, GEORGE (M) assistant engineer, Aeromarine Plane & Motor Co., Keyport, N. J.; (mail) Provost Avenue.

KISSINGER, CLAUDE E. (S M) assistant mechanical engineer (designing), National Advisory Committee for Aeronautics, Langley Field, Va.; (mail) 258 Chapel Street, Hampton, Va.

LENDL, CHARLES A. (M) mechanical and aeronautical engineer, 125 Victoria Boulevard, Kenmore, N. Y.

MARION, FRANK IVICHIEVICH (J) lubrication engineer, Gulf Refining Co., Toledo; (mail) P. O. Box 323.

McVEIGH, JOHN ROSS (J) research designer, Continental Motors Corp., Detroit; (mail) 453 South Phillip Street.

NORMAN, E. (A) general manager, A. L. Fell Motor Car Contracting Co., 715 Sebor Street, Chicago.

SMALLEY, LEE L. (M) chief engineer, Bendix-Cowdrey Brake Tester, Inc., 401 Bendix Drive, South Bend, Ind.

SMITH, J. O'HARA (A) technical sales, Standard Oil Co. of California, Los Angeles; (mail) 1641 South Hipoint Street.

TREGOE, BENJAMIN B. (A) sales manager, Woodall Industries, Inc., 7565 Six Mile Road, East, Detroit.

VAN DEVENTER, F. MARION (M) general foreman, Department of Water & Power, Los Angeles; (mail) 4514 Russell Avenue.

VON SODEN, COUNT ALFRED M. (F M) director, Zahnradfabrik Friedrichshafen A. G., Friedrichshafen am Bodensee, Germany.

WALDRON, CLOYD D. (J) junior mechanical engineer, National Advisory Committee for Aeronautics, Langley Field, Va.; (mail) 61 Linden Avenue, Hampton, Va.

WIERENGO, JOHN L. (A) president, treasurer, John L. Wierengo & Staff, Inc., 610 Building & Loan Building, Grand Rapids, Mich.

Applicants for Membership

ALTER, HORACE JULES, engineer, Curtiss Aeroplane & Motor Co. Inc., Buffalo.

ANDERSON, ALVIN P., lubrication technologist, Shell Petroleum Corp., Wood River, Ill.

BURDICK, CHARLES LALOR, assistant chemical director, E. I. DuPont de Nemours & Co., Wilmington, Del.

FIKE, LIEUT. C. L., U. S. M. C., Naval Air Station, San Diego, Calif.

FINN, E. PHILIP, president, Publix Oil Co., Boston.

FIRESTONE, RUSSELL ALLEN, general manager, mechanical rubber goods, Firestone Tire & Rubber Co., Akron, Ohio.

FISHER, CLARENCE E., designer, Glenn L. Martin Motors Co., Baltimore.

GLOVER, JOHN H., Grosse Ile, Mich.

HALL, GLENDON C., aviation ignition repairman, Hawaiian Air Depot, Luke Field, T. H.

The applications for membership received between Sept. 15 and Oct. 15, 1932, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

HALSTEAD, WILLIAM G., garage proprietor, Halstead's Motor Garage, Suva, Fiji Islands.

LAIRD, GEORGE ALEXANDER WILLIAM, engineer, Studebaker Corp. of Canada, Ltd., Walkerville, Ont., Canada.

MALLEY, JAMES G., superintendent of maintenance, Buckeye Stages, Inc., Columbus, Ohio.

MCCULLOUGH, ARTHUR LEE, operations manager, Cia Nacional Cubana de Aviacion, Gral Machado, Province de Havana, Cuba.

PRITCHETT, V. CLAYTON, lubrication assistant, Standard Oil Co. of N. J., Newark, N. J.

SMITH, MARSHALL DAVID, operator and agent, Humble Oil Refining Co., Houston, Tex.

SPURR, EDWARD, experimental designer, Raymond Mays, Eastgate House, Bourne, Lincolnshire, England.

ZAMBONI, GEORGE A., salesman, Sinclair Refining Co., San Francisco.

Personal Notes of the Members

(Concluded from p. 35)

position as chief engineer of Motor Improvements, Inc., of Chicago, to become assistant to the chairman of the Hat Corp. of America, of New York City.

R. C. McCullough, who was vice-president in charge of sales of The Dura Co., of Toledo, has been elected vice-president and general sales manager of the new company organized under the name Dura Co. to take over the plant and equipment of the old company and continue the business. It is announced that the production personnel and organization and the sales personnel of the previous company will be continued.

Bayard P. Sparks, formerly service traveler for the Buick Motor Co., of Flint, Mich., is now serving the Buick-Olds-Pontiac Sales Co. in New York City, as technical service representative in the Eastern region.

Frederick D. Thompson has relinquished his position as machinist with the Chevrolet Motor Co. in Flint, Mich., and is now in Britton, S. C.

Harry Tipper assumed the office of advertising director with the B. C. Forbes Publishing Co., of New York City, in September. From 1923 to 1932 he was general sales manager of the General Motors Export Co.

Thomas S. Westcott is now filling the position of night foreman of the garage department of the Star Printing & Publishing Co., of Toronto, Can. Prior to making this connection he was superintendent of the garage department of the Toronto Transportation Commission, also of Toronto.

In connection with the standardization of motor-vehicle equipment of the Standard Oil Co. of New Jersey, J. F. Winchester has been appointed to coordinate these activities of the company and his headquarters have been removed to 15 Washington Street, Newark, N. J.

Notes and Reviews

AIRCRAFT

Simple Aerodynamics and the Airplane. By C. C. Carter. Fourth revised edition of the original work by Charles N. Monteith. Published by the Ronald Press Co., New York City, 1932; 594 pp., illustrated. [A-1]

The character and scope of this work have not been changed materially in this fourth edition but the greater part of it has been rewritten and considerable additional matter included. The entire work was reviewed with the object of giving a logical, thoroughly coordinated, up-to-date and teachable presentation.

The author, who has had 11 years' experience in teaching the subject of aerodynamics and is at present on the staff of the United States Military Academy, states that this revision is considered satisfactory for a short course for cadets who are soon to receive commissions as second lieutenants.

Measurement of the Differential and Total Thrust and Torque of Six Full-Scale Adjustable-Pitch Propellers. By George W. Stickle. N.A.C.A. Report No. 421, 1932; 22 pp., illustrated. Price, 10 cents. [A-1]

Measurements of Flow in the Boundary Layer of a 1/40-Scale Model of the United States Airship Akron. By Hugh B. Freeman. N.A.C.A. Report No. 430, 1932; 15 pp., illustrated. Price, 5 cents. [A-1]

Characteristics of Clark-Y Airfoils of Small Aspect Ratios. By C. H. Zimmerman. N.A.C.A. Report No. 431, 1932; 12 pp., with tables and charts. Price, 5 cents. [A-1]

Strength Tests on Thin-Walled Duralumin Cylinders in Torsion. By Eugene E. Lundquist. N.A.C.A. Technical Note No. 427, August, 1932; 7 pp., 12 figs. [A-1]

Propeller Tip Flutter. By Fritz Liebers. Translated from *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, May 14, 1932. N.A.C.A. Technical Memorandum No. 683, September, 1932; 17 pp., 15 figs. [A-1]

The Aerodynamic Safety of Airplanes. By Louis Kahn. Translated from *Bulletin Technique du Bureau Veritas*, February, 1932. N.A.C.A. Technical Memorandum No. 684, September, 1932; 17 pp., 4 figs. [A-1]

Further Flight Tests on the Effectiveness of Handley Page Automatic Control Slots. By Wilhelm Pleines. Translated from *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, May 28, 1932. N.A.C.A. Technical Memorandum No. 686, September, 1932; 13 pp., 12 figs. [A-1]

Dynamic Tests of Keystone B-3A Bomber Oleo Shock-Absorber. Air Corps Technical Report No. 3392. Published by the Chief of the Air Corps, City of Washington; June 30, 1932; 6 pp., illustrated. [A-1]

Comparison of the Structural Design Requirements for Airplanes with the

These items, which are prepared by the Research Department, give brief descriptions of technical books and articles on automotive subjects. As a rule, no attempt is made to give an exhaustive review, the purpose being to indicate what of special interest to the automotive industry has been published.

The letters and numbers in brackets following the titles classify the articles into the following divisions and subdivisions: *Divisions*—A, Aircraft; B, Body; C, Chassis Parts; D, Education; E, Engines; F, Highways; G, Material; H, Miscellaneous; I, Motorboat; J, Motorcoach; K, Motor-Truck; L, Passenger Car; M, Tractor. *Subdivisions*—1, Design and Research; 2, Maintenance and Service; 3, Miscellaneous; 4, Operation; 5, Production; 6, Sales.

Loads Obtained in Full-Scale Pressure-Distribution Tests. Air Corps Technical Report No. 3509. Published by the Chief of the Air Corps, City of Washington; June 30, 1932; 36 pp., with tables and charts. [A-1]

New Methods of Research. By H. E. Wimperis. Published in *Aircraft Engineering*, June, 1932, p. 151. [A-1]

This paper constitutes the 12th Wilbur Wright Memorial Lecture delivered before the Royal Aeronautical Society. Details of the new R.A.E. 24-ft. and vertical wind-tunnels and the seaplane tank are given.

The Estimation of Profile Drag. By W. R. Andrews. Published in *The Aircraft Engineer*, supplement to *Flight*, June 17, 1932, p. 530a (41), and July 29, 1932, p. 710a (49). [A-1]

In this paper Mr. Andrews analyzes the test data from the variable-density wind-tunnel of the National Advisory Committee for Aeronautics and evolves certain empirical formulas that he has found to give a closer approximation than any hitherto employed. The generalization of k_{tmax} may, the author admits, be subject to errors, and the presentation may be by no means accurate, but with the information available it was the best he could do, and the results appear to give a reliable guide to the full-scale characteristics of any practical airfoil.

Air Flow. By W. S. Farren. Published in *The Journal of the Royal Aeronautical Society*, June, 1932, p. 451. [A-1]

The author contends that, notwithstanding recent advances in the knowledge of air flow, the student of aerodynamics must still depend upon his "air-sense." Although this sense is often an inborn faculty, undoubtedly it is developed by experience preserved unconsciously in the mind, and the author urges that an effort be made to

acquire this characteristic to some degree by studying what air does by looking at it. He describes an apparatus developed to make this possible by demonstrating air flow on the screen by smoke and gives a series of demonstrations in both graphical and descriptive form.

Torsion Calculations for a Rear Fuselage with Two or More "Unknowns." H. Davies. Published in *The Aircraft Engineer*, supplement to *Flight*, June 17, 1932, p. 530e (45), and July 29, 1932, p. 710g (55). [A-1]

Certain difficulties are encountered when an attempt is made to solve a rear fuselage for torsion, with two or more unknown forces at the stern end. In this article the author outlines a simple method of overcoming the difficulties.

An Analysis of Meteorology, as Related to the Operation of Aircraft. Prepared and published by Harold Lewis Kirby. Printed by the Arthur H. Clark Co., Glendale, Calif., 1931; 120 pp. and index, illustrated. [A-4]

This work was prepared specifically for the United States Army Air Corps Reserve, United States Naval Reserve Air Force, applicants for Department of Commerce pilot's license, aircraft operators and commercial pilots. It is the direct result of an initial survey conducted some two years ago with the cooperation of certain Air Corps and Air Force officers and of study of the operation of aircraft under adverse conditions made before that time and since.

The book represents a thorough study of the science of meteorology from the standpoint of its relation to the practical operation of aircraft and includes full instruction in the use of meteorological instruments and data, weather reports and bulletins.

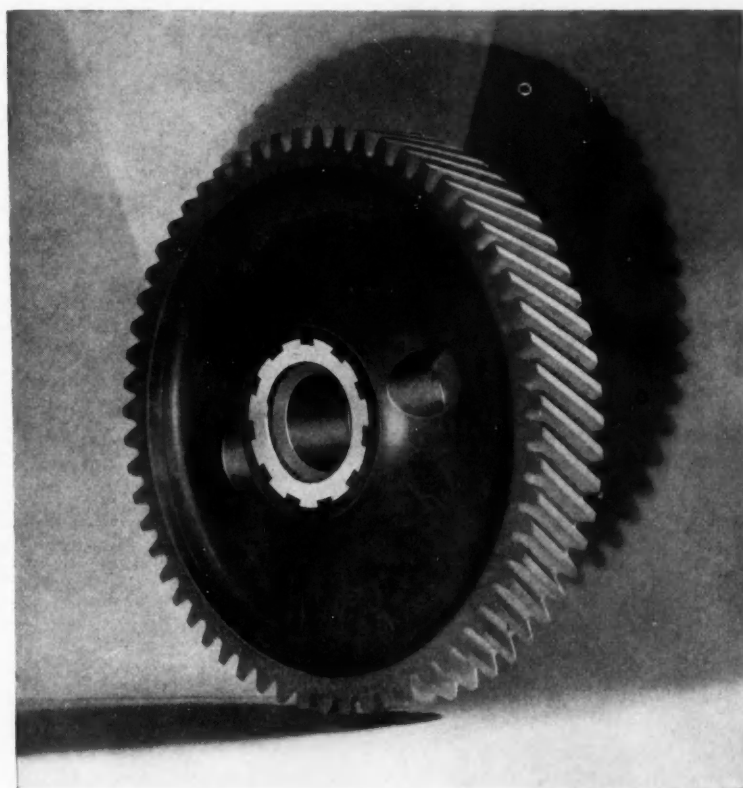
CHASSIS PARTS

Etude Théorique et Calcul des Mouvements de Galop des Voitures Automobiles. By G. Leroux. Published in *La Technique Automobile et Aérierne*, second quarter, 1932, p. 37. [C-1]

Gallop, defined as the pitching motion of an automobile induced by the interaction of suspension and gravity on sprung weight, is a phenomenon of distinct importance; and its mathematical analysis can throw a penetrating light on the more obscure and delicate phases of spring suspension.

These are the two theses of the author, who, in proof, presents a theoretical study of gallop—its origin, equations representing the type and amplitude of motion arising from it and an analysis of certain special cases. Application of the theory to a current automobile is then made, with some discussion of the influence of road type, suspension and vehicle design. The discussion leads up to recommenda-

(Continued on next left-hand page)



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Notes and Reviews

Continued

tions as to spring characteristics and to an emphasis on the importance of shock-absorbers.

Les Principales Causes d'Usure des Engrenages à Axes Parallèles et à Denture Droite. By Jean Pérignon. Published in *La Technique Moderne*, Aug. 1, 1932, p. 489. [C-1]

Two factors which the author's work has led him to believe are of particular significance in gear wear, although they are sometimes overlooked, are emphasized in this study. They are static surface pressure and what is termed interferences of the second order, or that type of incorrect tooth contact which is manifested not by a sharp shock but by gradual transition from correct to incorrect relations.

Sliding friction is asserted to be significant only in aggravating other wear factors of primary importance. The contributing influences of gear material, heat-treatment and lubrication are briefly discussed.

ENGINES

The N.A.C.A. Apparatus for Studying the Formation and Combustion of Fuel Sprays and the Results from Preliminary Tests. By A. M. Rothrock. N.A.C.A. Report No. 429, 1932; 19 pp., illustrated. Price, 10 cents. [E-1]

Fuel Vaporization and Its Effect on Combustion in a High-Speed Compression-Ignition Engine. By A. M. Rothrock and C. D. Waldron. N.A.C.A. Report No. 435, 1932; 25 pp., illustrated. Price, 10 cents. [E-1]

The Mechanism of Atomization Accompanying Solid Injection. By R. A. Castleman, Jr. N.A.C.A. Report No. 440, 1932; 12 pp., illustrated. Price, 5 cents. [E-1]

Tests on Thrust Augmentors for Jet Propulsion. By Eastman N. Jacobs and James M. Shoemaker. N.A.C.A. Technical Note No. 431, September, 1932; 5 pp., 3 figs. [E-1]

The Strobophonometer. By R. Stansfield and R. E. H. Carpenter. Published in the *Journal of the Institution of Petroleum Technologists*, June, 1932, p. 513. [E-1]

The general opinion that, when engine conditions are changed from smooth running, through rough, to the detonating stage, a new high-frequency note is introduced with very little change in other existing audible frequencies, has been responsible, the authors contend, for the development of instruments of the phonometer type for knock testing, including frequency filters designed to pass only the higher frequencies above approximately 2000 to 3000 cycles per sec.

To make sure that the true conditions were fully understood, preliminary tests were made on three engines of widely different types, using a good carbon microphone as the receiver and a valve amplifier, which included a tuneable-frequency selective voltmeter. In this way the entire sound spectrum from about 200 up to 10,000 cycles per sec. was explored. A curve of sound intensity against frequency was plotted for each engine in the smooth-running conditions, and then under knocking conditions. A series of peaks, generally descending in height with rise of frequency, was found to exist for both types of running, no new peak being introduced with change from smooth running to audible knock.

With these studies as a basis, the authors designed an apparatus which they state overcomes the common difficulties of other listening methods. The Strobophonometer is an instrument for the analysis and measurement of sounds or vibrations emanating from any source in cycles. It applies to sound from an engine or other machine a principle analogous to that of the stroboscope; that is, it selects, on a time basis, some part of a recurrent noise to be investigated. The relative intensity of the noise is arranged to be indicated on a meter. The length of the listening period in degrees of cycle and the phasing of this period around the cycle of operations can readily be adjusted when necessary, and the use of a relatively short listening period is said to make external noises unimportant.

Fuel-Injection Engines with Subdivided Combustion Chambers and Heat Accumulator. By Kurt Neumann. Paper presented before the fifth national meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers at State College, Pa., June 8 to 11, 1932. [E-1]

Operation of airless-injection Diesel engines by a new method subdivides the compression space, the greater part being outside the cylinder contour. The author explains that this part may have a heat-accumulating body. Injection of fuel into this space

(Continued on next left-hand page)

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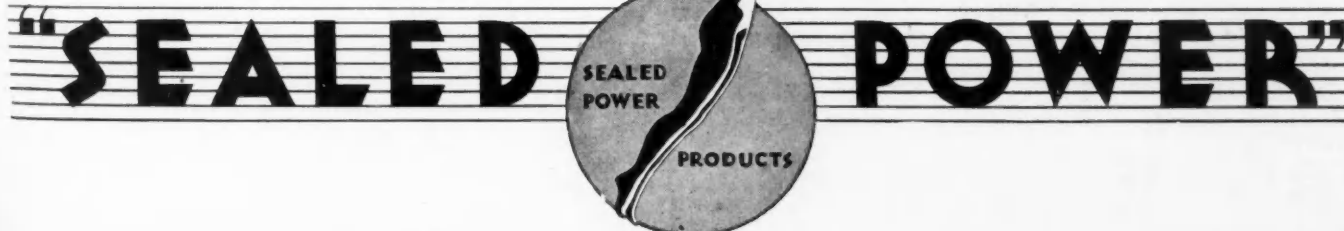
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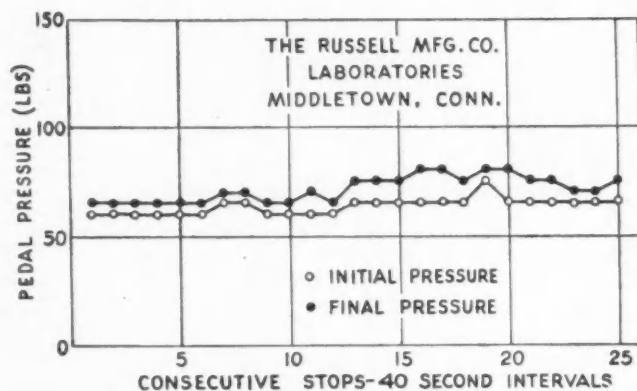


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Notes and Reviews

Continued

occurs shortly before dead center. The air displaced from the cylinder is guided so that it provides energetic turbulence in the space into which the fuel is being injected. Therefore, the fuel penetrates the available air supply uniformly, favoring quick ignition and complete combustion.

Fuel Injection in Gas Engines. By E. G. Beardsley and J. M. MacKendrick. Paper presented at the fifth national meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers at State College, Pa., June 8 to 11, 1932.

[E-1]

The development of the gas-injection engine is traced in this paper, together with the process of selective improvement of mechanisms that give the best results. The authors describe tests conducted to compare the gas consumption and the general heat balance of a four-cycle and a two-cycle engine with and without gas injection.

Inertia Supercharging of Engine Cylinders. By E. S. Dennison. Paper presented before the fifth national meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers at State College, Pa., June 8 to 11, 1932.

[E-1]

A theory for the supercharging effect produced in an engine cylinder when a long suction pipe is attached is developed in this paper. As a preliminary to this theory, equations are given for suction and exhaust flow where no inertia effects are present. Results of the theory are compared with experiment, and some data are given on the performance of an engine when supercharged in this way.

Surface-Volume Ratio as a Critical Factor in Automotive Diesel Combustion-Chambers. By Julius Kuttner. Paper presented before the fifth national meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers at State College, Pa., June 8 to 11, 1932.

[E-1]

Considering the surface-volume ratio of Diesel-engine combustion-chambers as a function of cylinder bore, the automotive Diesel-engine appears to be in a distinct class from the larger Diesel engines from which it was developed. The author points out that, although the Diesel engine has been proclaimed as the most advanced type of internal-combustion engine, the principal demand for automotive prime movers is still being met by engines other than the Diesel. The large ratio of surface to volume in the small-bore Diesel engine required for automotive work is held largely responsible. Progress has been made in overcoming the small-chamber handicap by subdividing it and making it work as a heat accumulator rather than as a heat dissipator.

Spray Characteristics of a Jerk-Pump Fuel-Injection System. By O. F. Zahn, Jr. Paper presented before the fifth national meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers at State College, Pa., June 8 to 11, 1932.

[E-1]

Tests were conducted with special spray-research apparatus aided by jerk-pump injection equipment in the oil-spray laboratory at Pennsylvania State College. The application of the conclusions reached is summarized as follows:

Variables that could be changed in engine installation are speed, load and nozzle-opening pressure. These would affect the combustion line on the indicator card only as they changed temperature, turbulence and spray characteristics. Within the range in which these operating variables were tested, only opening pressure would change the spray characteristics enough to produce a notable effect on combustion. It would also limit the minimum load that the engine could carry. The effects of speed and load on the spray would be negligible compared with their effects on temperature and turbulence. Combustion would be practically free from the effects of changing spray characteristics with a constant nozzle-opening pressure.

Heating Fuels for Injection Engines. By Edward Adams Richardson. Paper presented before the fifth national meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers at State College, Pa., June 8 to 11, 1932.

[E-1]

Three reasons are given for the heating of fuels for injection engines. These are (a) to reduce the viscosity of the fuel so that it can be handled by the fuel-injection system, (b) to overcome the ignition lag by heating to such a temperature that the fuel will ignite upon contact with air and (c) to heat the fuel so that upon injection it is effectively a gas and may burn directly and rapidly without the delays of drop transformation.

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Inertia Controlled

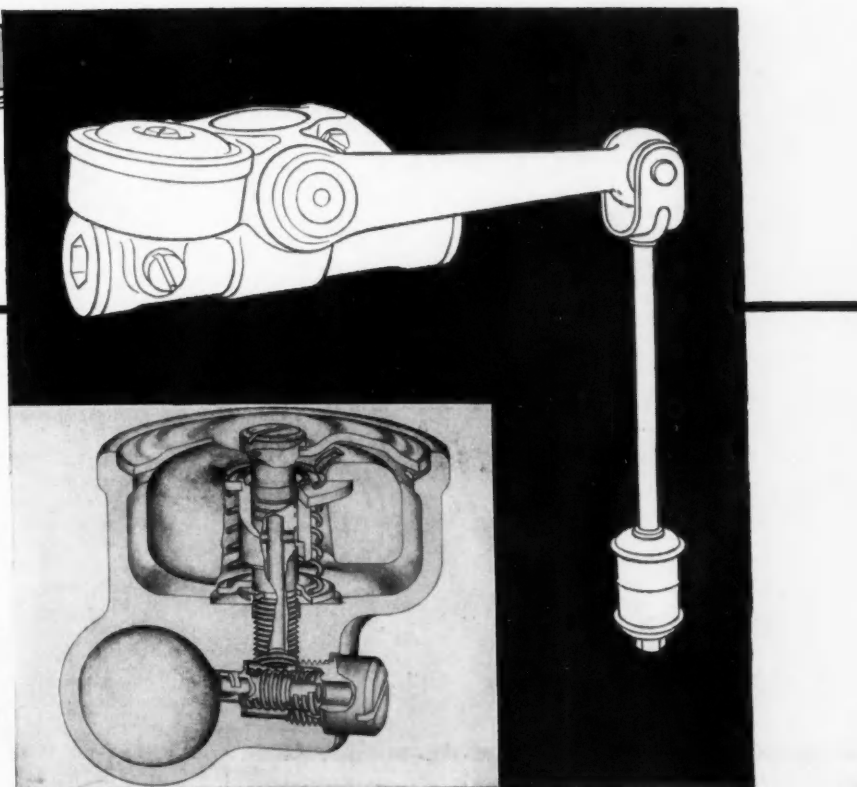
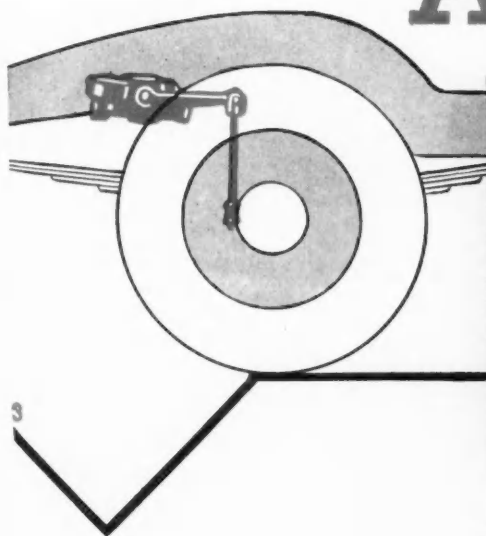
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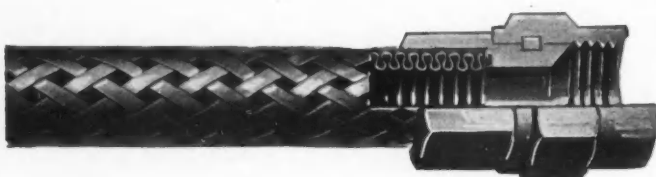
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Notes and Reviews

Continued

The author contends that the heating of fuels is worthy of study and that processes of fuel preparation involving heating are almost within reach. He predicts that coal, after some sort of processing, will be used in Diesel engines, and that when this time inevitably comes, with a development in the use of fuel growing out of the improvements in the use of oil in Diesels, a substantial increase in the size of internal-combustion engines and the extent of their use should occur.

Combustion Processes in Aircraft Engines. By H. K. Cummings. Paper presented at the sixth national meeting of the aeronautic division of the American Society of Mechanical Engineers at Buffalo, June 6 to 8, 1932. [E-1]

This paper deals chiefly with combustion as studied in actual engines. The work of various investigators is reviewed and a bibliography of 34 references is appended.

Vergleichsversuche mit einem MAN 5-t Lastwagen, Ausgerüstet mit Diesel-Motor bzw. Vergasermotor. By H. Kluge and K. v. Sanden. Published in *Automobiltechnische Zeitschrift*, July 25, 1932, p. 342. [E-1]

Comparative tests of the performance and fuel consumption of a MAN 5-ton truck equipped with a Diesel engine and a carburetor engine are described and their results presented. The Diesel engine had a cylindrical capacity about one-fourth greater than that of the gasoline powerplant. The investigation was conducted on a test stand in the Karlsruhe technical university and the results are interpreted in terms of road operation. The tests were made under varying conditions of useful load, vehicle speed and road grade.

Versuche über den Einfluss von Saug- und Auspuffrohrlänge auf den Liefergrad. By Otto Klüsener. Published in *Automobiltechnische Zeitschrift*, June 25, 1932, p. 299. [E-1]

The tests herein reported were conducted in the department of internal-combustion engineering of the Hannover technical university. Their purpose was to ascertain the effect of inlet and exhaust manifold length on delivery rate. One, three and four-cylinder engines were included in the investigation. Special attention was paid to the influence of pulsations in the manifold. The experimental results are stated to show good correlation with calculated values.

Verbrennungsverlauf, Luftüberschusszahl, Verpuffungsgrenzen, Abgaszusammensetzung und Heizwerte von Kraftstoff-Luftgemischen. By Professor Wawrzyniak. Published in *Automobiltechnische Zeitschrift*, May 10, p. 236; May 25, p. 263; June 25, p. 310; July 10, p. 335, and July 25, 1932, p. 358. [E-1]

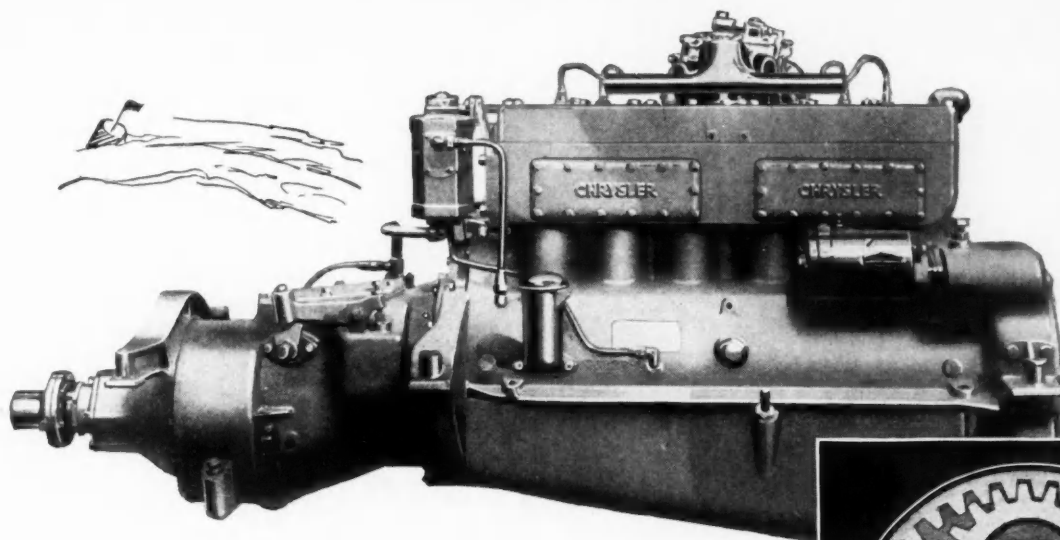
Previous investigation of combustion processes had demonstrated that maximum rates of flame propagation and mean combustion pressures are largely dependent upon the extent to which excess air is present in the burning fuel-air charge. The only method used for the determination of this factor had been its calculation from the measurements of air and fuel used and the chemical composition of the latter. The fact that this method did not lead to reliable results caused some uncertainty as to the accuracy of the method. Moreover, new experimental tools had become available, such as the piezo-quartz indicator, the Haber-Lowe interferometer and a method of exhaust-gas analysis. For these reasons a further investigation into the complex question of combustion processes was undertaken, using the most accurate methods available and eliminating the experimental errors that had to some extent invalidated the previous research.

Twelve fuels were investigated: pentane, hexane, heptane, isooctane, methylheptane, cyclohexane, four commercial gasolines and a chemically pure and a commercial benzol. In determining the presence of excess air, two factors are said to be of importance; the chemical composition of the fuel and the concentration of the fuel-air mixture. The interferometer yielded the only accurate information on the latter. A new method of determining excess air from exhaust-gas analysis is presented. Errors in the determination of calorific values of fuel-air mixtures are pointed out, and correct values for the fuels investigated were ascertained. The limiting fuel-air ratios for combustion were also investigated and fixed.

Les Compresseurs Volumétriques à Pistons S.E.B.I.A. Published in *L'Aéronautique*, June, 1932, p. 163. [E-1]

A piston-type compressor is described, for which peculiar suitability for supercharging at high altitudes is claimed because of its

(Continued on next left-hand page)



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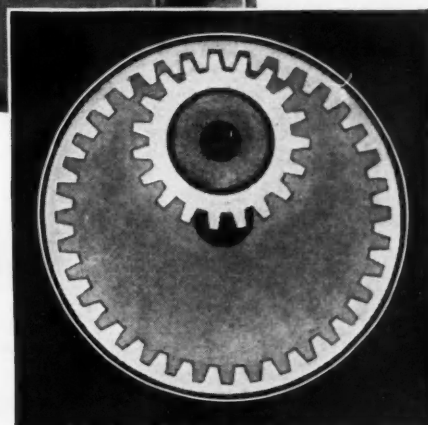
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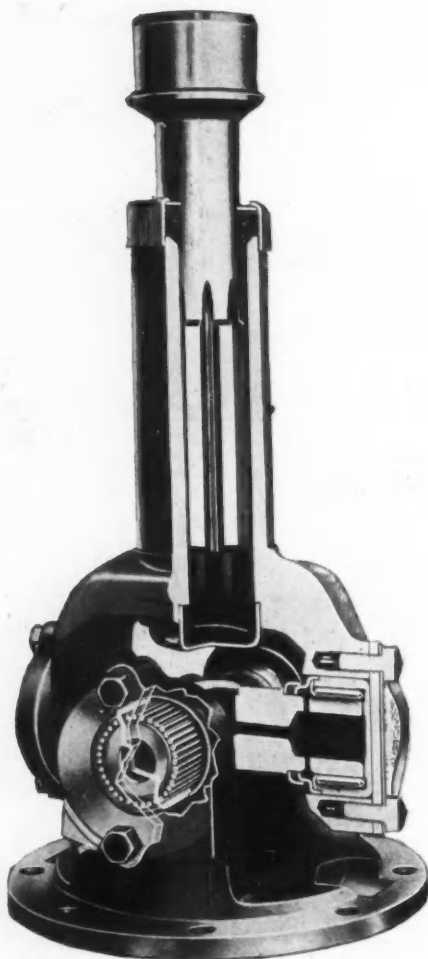
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Notes and Reviews

Continued

ability to furnish a high ratio of discharge to inlet pressure. A characteristic of the compressor, which is made up of two opposed cylinders on different vertical planes, is the synchronization of its pulsations with those of the engine. Design, operation and results of operation are covered in the article. A volumetric efficiency of 67.3 per cent and a total isothermic efficiency of 44.84 per cent are claimed, with the additional statement that the latter figure could be raised to 55 per cent under more suitable conditions of operation.

Erfahrungen beim Betrieb von Luftfahrzeugmotoren. By Bruno Bruckmann. Published in *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, July 28, 1932, p. 423. [E-1]

Drawing on the results of actual operating experience, the German Institute for aeronautical research herein presents a summary of the accomplishments, failures and developments of aircraft engines in Germany. The observations apply particularly to the powerplants used in commercial aviation, since reliable information on those used for personal and sport purposes is difficult to obtain.

Statistics give the number of engines in operation, their total flying time and the operating hours between overhauls. The general topics of starting, warming up, fuel consumption and lubrication are dealt with in the first section of the article. The second section discusses individually the separate parts, such as crankcases, cylinders and accessories, valves and valve springs, pistons, connecting-rods, crankshafts and bearings.

Quelques Considérations sur le Moteur Diesel Automobile. By Philippe Léchères. Published in *Journal de la Société des Ingénieurs de L'Automobile*, June, 1932, p. 1794. [E-1]

Drawing on six years' experience with the Compagnie Lilloise de Moteurs, which is stated to have manufactured more than 4000 Diesel engines, the author analyzes, from an engineer's viewpoint, the fundamental problems of automotive Diesel engines.

His belief is that, in the field of design, the mechanical features of the engine must be absolutely adapted to the chemical characteristics of the fuel. Of these properties he lists four as of main importance and points out five structural requirements imposed by them. The ability to resist high pressures is emphasized and the necessary weight reduction is said to be obtainable by departing from the conventional gasoline-engine design. The opposed-piston two-stroke-cycle Lilloise engine is cited as a successful exponent of this theory. The author dwells on the importance of turbulence and the advantages of the two-stroke cycle.

Among manufacturing problems, the production of castings holds an important place. The author's company, he asserts, has made castings superior to the best in Germany and in this Country, and the same claim is put forth for special steels.

Difficulties confronting the user are exhaust-gas odor and the lack of a uniform fuel supply. Both of these can be met, in the opinion of the author, by a further refining of the fuel.

Le Moteur Jalbert 200-Hp. à Huile Lourde. Published in *L'Aéronautique*, July, 1932, p. 223. [E-1]

Three essentials of an aircraft Diesel engine, the author's analysis leads him to conclude, are a compression ratio of 10:1, a mean effective pressure of 7.5 kg. (26.45 lb.) and a speed of 2400 r.p.m. To what extent the Jalbert heavy-oil engine approaches these ideals is shown by numerous performance curves. Its advantages over other heavy-oil engines are attributed to its fuel-feeding system, which furnishes the charge in a gaseous form. This system consists, roughly, of an injection cylinder into which the fuel is metered by a needle-type carburetor placed above the working cylinder.

In the general comparison of heavy-oil and gasoline engines preceding the description of the Jalbert engine, merit ratings consisting of the product of mean effective pressure and speed are developed for various types of current powerplant. The Jalbert is rated highest of the heavy-oil aircraft engines and on a par with the lowest of the gasoline aircraft engines.

Aircraft-Engine Mechanics' Manual. By C. John Moors. Published by the Ronald Press Co., New York City, 1932; 511 pp., illustrated. [E-2]

This text is offered to student aircraft pilots and to engine mechanics who, the author contends, should have a thorough knowledge of the powerplant principles before undertaking aircraft-engine repairs.

(Continued on second left-hand page)

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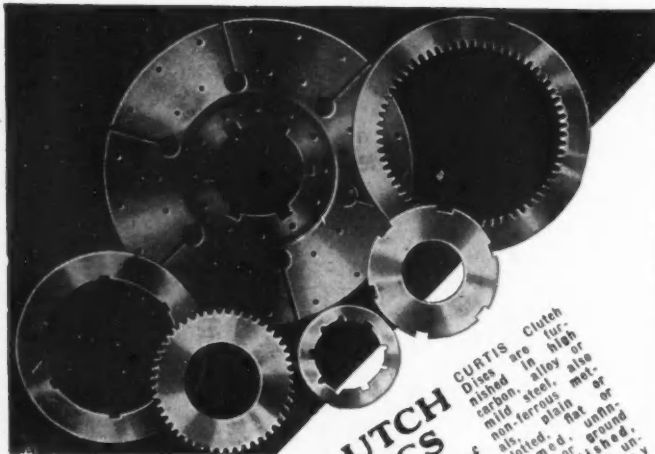


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Notes and Reviews

Continued

Elements of Mechanics; Aircraft-Engine Construction and Repair Principles; Carbureters, Superchargers, Fuels and Lubricants; Engine Ignition and Electrical Equipment; Aircraft-Engine Operation and Maintenance; and Construction, Repair and Maintenance of Specific Aircraft Engines are the general classifications covered in this book.

MATERIAL

Symposium on Rubber. Published by the American Society for Testing Materials, Philadelphia, 1932; 159 pp., illustrated [G-1]

The papers and discussions appearing in this volume were presented at a symposium on rubber held at the third regional meeting of the American Society for Testing Materials, in Cleveland, in March, 1932. The papers were prepared primarily to include information of value to the engineer, not solely to the expert in rubber technology. The papers were presented in two groups: (a) those on manufacture of rubber products; (b) those on the properties of rubber as an engineering material.

In the latter group the paper entitled, Shock and Vibration Properties of Rubber in the Automobile, by W. J. McCortney, is of particular interest. Mr. McCortney describes the characteristics and tests for rubber for use in parts of the automobile other than tires and gives special attention to the formation of standard testing procedures.

Relation of C.F.R. Knock Ratings to Behavior of Fuels in Service. By T. A. Boyd. Paper presented before the midyear meeting of the American Petroleum Institute at Tulsa, Okla., June 1 to 3, 1932. [G-1]

This paper constitutes a progress report on the work of the Detonation Subcommittee of the Cooperative Fuel-Research Committee, of which Mr. Boyd has been Chairman since the Subcommittee's appointment early in 1928.

Preliminary work with a view toward correlating the C.F.R. knock-testing apparatus and method with the actual road performance of fuels in automobile engines is reported.

Mechanical Properties of White-Metal Bearing Alloys at Different Temperatures. By H. K. Herschman and J. L. Basil. Paper presented at the 35th annual meeting of the American Society for Testing Materials at Atlantic City, N. J., June 20 to 24, 1932. [G-1]

A study was made of the wear resistance and other mechanical properties of 10 white-metal bearing alloys. These included two tin-base and seven lead-base alloys and one cadmium-zinc alloy. Each of the properties, with the exception of wear, was determined at several temperatures. No one of the alloys tested was found to excel in all of the mechanical properties studied.

Crankshaft bearings consisting of two tin-base and two lead-base alloys were prepared for service tests in Class-B Army trucks. The results of the tests indicated that the tin-base alloys were superior in wear resistance to the lead-base alloys. These results were consistent with those obtained on wear in the laboratory tests.

Other papers of interest presented at this same meeting are:

Mechanism of Deformations in Gray Iron. By J. W. Bolton. [G-1]

Thermal Effects in Elastic and Plastic Deformation. By M. F. Sayre. [G-1]

Fatigue of Shafts Having Keyways. By R. E. Peterson. [G-1]

Fatigue Failure under Repeated Compression. By H. R. Thomas and J. G. Lowther. [G-1]

Influence of Recrystallization Temperature and Grain Size on the Creep Characteristics of Non-Ferrous Alloys. By C. L. Clark and A. E. White. [G-1]

Factors Affecting the Physical Properties of Cast Red Brass. By H. B. Gardner and C. M. Saeger, Jr. [G-1]

The Electric Strain-Meter and Its Use in Measuring Internal Strains. By R. E. Davis and R. W. Carlson. [G-1]

An Automatic Autographic Extensometer for Use in Tension Tests of Materials. By R. L. Templin. [G-1]

Report of Research Committee on Fatigue of Metals. H. F. Moore, chairman. [G-1]

(Concluded on second left-hand page)

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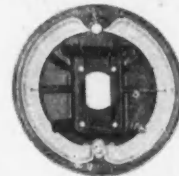
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Notes and Reviews

Concluded

Report of Committee D-2 on Petroleum Products and Lubricants and Methods of Test Relating to Petroleum Products, 1932. Reprinted from *Proceedings of the American Society for Testing Materials*, Philadelphia; 286 pp. [G-1]

This pamphlet brings together in convenient form the 1932 Report of Committee D-2 on Petroleum and Lubricants, the various A.S.T.M. standard and tentative standard methods of test pertaining to petroleum and the personnel of Committee D-2 and its subcommittees and technical committees.

Metallurgical Problems of the Diesel Engine. By R. J. Allen. Paper presented before the fifth national meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers at State College, Pa., June 8 to 11, 1932. [G-1]

The metallurgical problems of the Diesel engine are presented under the headings: Selection of Materials, General Types of Material, Inspection and Testing of Materials, Failures and Material Application. The author concludes that, with the exception of those having to do with the combustion chamber, the metallurgical problems of the Diesel engine are similar to those of prime movers of other reciprocating types.

Die Schubmoduln von Furnier und Sperrholz. By Heinrich Hertel. Published in *Luftfahrtforschung*, June 21, 1932, p. 135. [G-1]

Supplementing earlier investigations, tests were conducted and calculations made on the elastic properties of birch veneer and birch plywood. The results are stated to confirm the favorable findings of the previous research. These tests are thought to be the first of the kind to reach publication. Among other factors investigated were the effect of the thickness of the plies and the differences in the characteristics of laminated and plywood construction.

Holvergütung durch Tränken und Aufteilen in Dünne Einzellagen. By Paul Brenner and Otto Kraemer. Published in *Luftfahrtforschung*, June 21, 1932, p. 145. [G-1]

The fact that wood has largely given way to metal as an aircraft structural material in the years since the war has been attributed to a number of disadvantageous characteristics of wood, principal among them being warping, water absorption and lack of uniformity in strength characteristics. The tests herein described are intended to show the possibility of improving these characteristics of wood by soaking in water and the use of laminated construction.

L'Utilisation des Gaz Comprimés pour les Besoins des Campagnes et la Traction Automobile. By Eugène Wibratte. Published in *Le Génie Civil*, July 16, 1932, p. 64. [G-4]

The needs of French rural communities for gas can best be met, according to the author, by the distribution of compressed gas in suitable receptacles. Why not coordinate with developments along this line the use of compressed gas as fuel for automotive vehicles? he asks. Arguing this point, the author quotes wartime experience and more recent tests with a Panhard truck in which the gas was shown to develop from 35 to 45 per cent more power than gasoline, with a relative consumption of 16 cu. m. (565.02 cu. ft.) of gas to 10 liters (2.64 gal.) of gasoline.

MISCELLANEOUS

The National Physical Laboratory Report for the Year 1931. Published by His Majesty's Stationery Office for the Department of Scientific and Industrial Research, 1932; 313 pp. [H-1]

The annual report of the British National Physical Laboratory is now available for 1931. The reports of the engineering and aerodynamic departments cover the research of greatest interest to the automotive industry, although those of the electricity, meteorology and physics departments also include notes on investigations of importance to the automotive engineer.

The subjects investigated are diverse and too numerous to list in this column.

PASSENGER CAR

General Servicing. By J. A. Roenigk. Published by the McGraw-Hill Book Co., Inc., New York City and London, 1932, 91 pp., illustrated. [L-2]

This booklet is another in the maintenance series of instruction manuals for automobile mechanics of the McGraw-Hill vocational texts. It consists of servicing instructions on all essential units of the fuel, exhaust, lubricating and cooling systems of automotive engines. The text is a comprehensive treatment of that portion of maintenance service which is performed generally in authorized service stations.